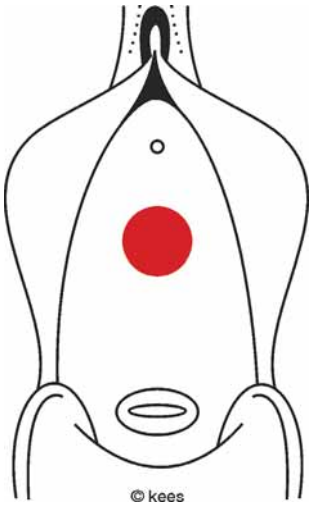
obstetric fistula surgery

art and science



comprehensive manual for trainees

training manual

cohort analysis in 2,500 consecutive vvf/rvf patients

kees waaldijk MD PhD

chief consultant fistula surgeon

foreword

before one is able to master the noble art of obstetric fistula surgery one has to study and understand the science of the complex trauma of the obstetric fistula, the science of the urine continence/closing mechanism in the female, the science of the pelvic (floor) anatomy and the science and principles of general, septic, gynecologic, urologic, colorectal, plastic and reconstructive surgery as well as the physiologic wound healing processes

it will take years of serious study combined with even more years of hard practice to acquire the expert skills, and requires stamina, self criticism, documentation, objective auditing, analysis of the whole process and an innovative mind in an ever-lasting urge to execute the next repair better than the previous one; in an effort to ensure customized state of the art obstetric fistula surgery to achieve the best for each individual patient

this manual has been prepared to explain first the science and then the art in order to help other surgeons in a systematic surgical approach

it is based upon a personal experience of 18,000 fistula and fistula-related operations which has been meticulously documented and audited since the very beginning in 1984; with a final overall evidence-based success rate at closure of 97-98%

It is time for the author to share his extensive experience with others; however, though the author considers his work as public domain he insists upon recognition

this is the first in a series of books to describe the **art and science** of obstetric fistula surgery

kees waaldijk 25th of april 2008

table of contents

the obstetric fistula

short notes/checklist

hand-out to trainees

based on

the (surgical) management of the obstetric fistula

as practiced in

the national vvf project nigeria

state of the art obstetric fistula surgery

evidence based over 98% final closure rate

continuous ground breaking research

peer reviewed science

long-term follow-up

total pre-, intra- and postoperative documentation

personal experience in 18,000 VVF/RVF-repairs

postgraduate training of 315 doctors, 322 nurses and 70 other persons

15 workshops

unfpa fortnight

kees waaldijk MD PhD

first edition january 1992

20th edition april 2008

the (surgical) management of the obstetric fistula has to start the moment the leaking of urine becomes manifest

no need to become an outcast

the immediate management by catheter and/or early closure is highly successful and will prevent the woman from becoming an outcast

the best way to treat the whole patient is by closing the fistula

do not waste time, energy and money on things which make no sense

concentrate on the most important thing: close the fistula

prevention

only by building hospitals, roads and schools
lesson learned from history

introduction VVF/RVF

VVF: **V**esico**V**aginal **F**istula, an abnormal connection between the bladder and the vagina: a urine fistula

RVF: **R**ecto**V**aginal **F**istula, an abnormal connection between the rectum and the vagina: a stool fistula

causes

a. pressure necrosis due to obstructed labor, the **obstetric fistula**
b. surgery: hysterectomy, colporrhaphy, cesarean section
c. malignancy
d. radiation
e. trauma
f. congenital malformation
g. infection

main cause is prolonged obstructed labor

though the obstetric fistula has disappeared from the industrialized world it is still very prevalent in the developing world and accounts for over 85% of all the fistulas world-wide

symptoms

VVF: **continuous** leaking of urine thru the vagina 24 hours a day which can not be stopped or cleaned

RVF: **intermittent** passing of stools from the vagina which can be stopped (unless diarrhea) and cleaned

social acceptance

therefore the patient with a VVF is socially far less acceptable than the patient with a RVF

social, medical and mental implications

in Africa it means that the VVF-patient is ostracized from her own community and has to live as an outcast with progressive downgrading medically, socially and mentally

prevalence

a minimum of 2,000,000 VVF-patients world-wide awaiting surgery of whom at least 80-90% are in Africa

treatment

mainly surgery by different operation techniques

prognosis after successful repair

medically: good
socially: good
mentally: good

there are no simple fistulas

it only looks simple in the hands of the

few expert fistula surgeons

fig 1 necrosis

fig 2 necrotic fistula

fig 3 pubococcygeus muscle necrosis

fig 4 slough + lochia

fig 5 slough

fig 6 necrotic tissue

fig 7 aggressive urine

fig 8 decubitus ulcer

fig 9 ammonia dermatitis

fig 10 vulva edema

fig 11 loss of labia minora/majora

fig 12 exfoliation of skin

the obstetric fistula: a complex trauma

incidence of obstetric fistula

a minimum of 2-5 per thousand deliveries when the mother survives in situations where there is no easy access to a functioning obstetric service; this means for Africa an annual incidence of some 100,000 to 150,000 new fistula patients
there is no relation to race, tribe, religion, culture, early marriage or anything else, **except for** early intervention by CS within 3 hours from the moment obstructed labor has developed

prevalence of obstetric fistula

in Africa a minimum of 1,500,000 fistula patients awaiting surgery

cause of obstetric fistula

obstructed labor (pressure necrosis) and/or cesarean section and/or primitive obstetric practices

mechanism of action in obstructed labor

the fetal head is too big or lies/presents abnormally and gets stuck inside the birth canal; then the soft tissues are compressed between the hard fetal skull and the hard maternal pelvic bones; if this is not relieved within 3 hours by cesarean section, tissue necrosis (no blood supply) occurs and a fistula develops

which structures are at risk

the anterior vagina wall/bladder/urethra are more at risk than the posterior vagina wall/rectum; also the lateral vagina walls (levator ani muscles), cervix/ uterus and deeper pelvic structures (nerves, ligaments, periost etc) are at risk

isolated VVF

this is the rule: 85% of the patients

combination VVF/RVF

the VVF is combined with RVF in some 10-15% of the patients

isolated RVF

very seldom except for sphincter ani rupture with distal rectum trauma

intravaginal lesions due to obstructed labor

always tissue loss of posterior urethra/bladder and/or anterior rectum
always tissue loss of pubocervical fascia and/or prerectal fascia
always tissue loss of anterior and/or posterior vagina wall
vagina stricture, vagina stenosis, vagina shortening and even vagina atresia
tissue loss of pubococcygeus, iliococcygeus and ischiococcygeus muscles resulting in bare pubic bones with loss of periost and symphysis cartilage
trauma to arcus tendineus fasciae and arcus tendineus of levator ani muscles with even tissue loss of internal obturator muscle
tissue loss of broad, cardinal and sacrouterine ligaments resulting in cervix/ uterus prolapse
tissue loss of cervix/uterus; total loss is seldom
endometrium trauma with secondary amenorrhea
trauma to internal and external sphincter ani muscles
trauma to perineal body
tissue loss of labia minora

neurologic lesions due to obstructed labor
- peroneal nerve palsy due to compression of the sciatic nerve
- anesthesia of the vagina up to 4-6 weeks
- sphincter ani palsy with stool/flatus incontinence
- saddle anesthesia
- stroke due to hypertension; very seldom
- transient blindness; spontaneous healing

local extravaginal lesions due to prolonged obstructed labor
- pressure sores over sacrum, trochanter major, heel and scapula
- tissue loss of labia majora

systemic lesions due to the enormous trauma of prolonged obstructed labor
- poor general health and even cachexia
- severe anemia
- secondary amenorrhea due to excessive blood loss (SHEEHAN syndrome)

lesions due to continuous urine leakage
- amonia dermatitis around the vulva

wet clothes with offensive odor

in its **extreme form** the woman ends up with a **cloaca** and **empty pelvis** for which nothing can be done, she is **crippled for life**, physically, mentally, emotionally and socially and she will be **never again a normal woman**

the **enormous trauma of prolonged obstructed labor**
- is such that over 90% of the infants die inside the mother; then the head (its largest circumference) shrinks and the mother may be able to push the dead child out
- many times the mother dies as well in the process; ??how often??
- if the mother survives it is for the prize of a dead child and an obstetric fistula ...
- and then the real trouble starts

prevention of the obstetric fistula
- the lesson learned from history is that this is only possible by establishing a network of functioning obstetric units where at any time day and night an emergency cesarean section can be performed within one hour
- for the inhabited parts of Africa this means a **network of 125,000 to 150,000 obstetric units** fully equipped and with highly trained personnel and evenly distributed throughout the rural areas to have half the coverage of obstetric care in the industrialized world
- then a network of roads for transport and a network of schools for education, especially of the females, are needed as well

prevention of the woman from becoming an outcast
- this is very well feasible, even under primitive conditions, by the **immediate management by catheter and/or early closure**

neurologic trauma due to obstructed labor

I intrapelvic peroneal nerve trauma (drop foot)

the sciatic nerve or its lumbosacral plexus may be compressed between the hard fetal skull and bony maternal pelvis resulting in minor to total function loss of the peroneal nerve being part of the intrapelvic sciatic nerve

since the peroneal nerve is serving the mm tibialis anterior, extensor hallucis longus, extensor hallucis brevis, extensor digitorum longus, extensor digitorum brevis, peroneus longus, peroneus brevis and peroneus tertius this will result in (partial) atrophy of these muscles with weakness or loss of dorsiflexion and eversion of the foot

in its extreme form the foot is in inversion/plantiflexion and if long standing the Achilles tendon will shorten and contract especially when the patient is immobilized; in the end it will become a fixed inversion/plantiflexion contracture of the ankle if nothing is done

the incidence of peroneal nerve trauma in the obstetric fistula is high since signs of it are found in over 85% of the patients who present within 3 months after childbirth; and therefore it should be part of the routine examination

the degree of trauma is estimated by voluntary muscle testing VMT according to the Medical Research Council or MRC scale 0-5 whereby
grade 0 = no function whatsoever
grade 1 = only a muscle twitch
grade 2 = minimal movement (active dorsiflexion of toes)
grade 3 = active half-range dorsiflexion of foot if gravity is eliminated
grade 4 = active full-range dorsiflexion of foot with minor muscle weakness
grade 5 = normal

the gait is severely affected in grades 1-2(-3) which will produce the typical drop foot walking

since we cannot influence nerve healing we can only wait for spontaneous recovery or improvement which may take up to 2 years and occurs in over 90% of the patients
<u>active</u> muscle exercises by **immediate** mobilization/walking, with or without a stick, will prevent major muscle atrophy and contracture of the gastrocnemius muscle with the Achilles tendon; this is of utmost importance
passive ankle movements by physiotherapy will only prevent or reduce gastrocnemius muscle with Achilles tendon contracture and then only if started early enough and do not contribute anything else
pharadic stimulation is too complicated in developing Africa
if after 2 years the patient complains about severe drop foot, a tibialis posterior tendon transfer (with or without a lengthening achillotomy) can be performed but so far no patient came forward since this is of low priority to the patients

probably there is anesthesia of the anteriolateral and dorsolateral aspects of the lower leg and foot as well but we have not been testing this by sensitivity testing ST since we do not encounter ulceration of these areas

II sacral plexus trauma

the sacral plexus may be compressed between the hard fetal skull and maternal bony pelvis resulting in:

a atonic bladder with overflow incontinence with leaking urine

b minor or major stress incontinence with leaking urine

c sphincter ani paralysis with stool/flatus incontinence

d saddle anesthesia of vulva/perineum/buttocks; ulceration due to anesthesia

therefore routine examination of the obstetric fistula patients should include measuring bladder capacity, testing of anal sphincter reflex and, if this is negative, sensitivity testing ST of vulva/perineum/buttocks for saddle anesthesia

though sacral plexus trauma is regularly encountered immediately following obstructed labor, usually it heals spontaneously and most patients have no complaints after 4-6 weeks

however, rarely patients are encountered who have the combination of all these lesions longer than 2-3 yr and then we have nothing to offer

III anesthesia of the vagina

this is more or less a physiologic process during childbirth and lasts some 4-6 weeks afterwards probably due to trauma to the nerve endings in the vagina walls

this explains why in a selected group of patients primary suturing can be performed; with excellent results

IV stroke (cerebrovascular accident)

though actually not caused by obstructed labor four **teenage** patients were treated who had an obstetric fistula and had experienced a stroke due to hypertension (eclampsia) during obstructed labor resulting in facialis paresis with slurred speech and contralateral paralysis of the limbs; their recovery was very slow and incomplete

the complex trauma of the obstetric fistula

mobilize the obstetric fistula patient immediately

complex trauma of the obstetric fistula

as based on a personal experience in over 18,000 fistula repairs
and related operations

introduction

The variety of the complex trauma of the obstetric fistula is immense, from a minute fistula with minimal tissue loss to a cloaca in an empty pelvis with extensive intravaginal lesions and (sub)total loss of the intrapelvic soft tissues, extravaginal lesions, urine-induced lesions, neurologic lesions and systemic lesions.
The lesions are due to intravaginal pressure necrosis, intrapelvic compression of deep structures, immobilization, continuous urine leakage, blood loss and the amount of metabolic energy consumed during prolonged obstructed labor which may last from 2 to 7 days or longer.
Added to this may be the trauma of spontaneous (assisted) delivery, harmful practices by the traditional birth attendant or potentionally harmful practices by professionals such as craniotomy, vacuum delivery, forceps delivery and cesarean section.
If a repair has been performed already there is an additional surgical trauma which varies as well from minimal, in case of expert surgery, to extensive, if surgery was poor; some patients are really traumatized by surgeons who fail to understand the problems involved in obstetric fistula surgery since it looks so easy and then turns out to be so difficult.
Each fistula constitutes a unique entity which makes the (surgical) management of the obstetric fistula so intriguing and challenging. The more all the factors involved are understood and the more accurate the quantitative and qualitative amount of tissue loss is assessed the more effective obstetric fistula surgery can be executed.
This review has been based on the extensive history taking, systematic pre- and intraoperative examination and meticulous documentation of the findings by the author with a personal experience in over 18,000 obstetric fistula and fistula-related operations in Northern Nigeria from 1984 until today.

mechanism of action in obstructed labor

The fetal head is too big or lies or presents abnormally and gets stuck inside the birth canal; then the soft tissues are compressed between the hard fetal skull and the hard maternal pelvic bones; if this is not relieved within 3 hours by cesarean section, tissue necrosis (no blood supply) occurs and a fistula develops.
The enormous trauma of prolonged obstructed labor is such that over 90% of the infants die inside the mother; then the head (its largest circumference) shrinks and the mother may be able to push the dead child out. Many times the mother dies as well in the process though it is not possible to give figures.
If the mother survives it is for the prize of a dead child and an obstetric fistula ... and then the real trouble starts.
To understand what is happening it is good to realize that the maximum pressure of the soft tissues within the maternal pelvis is against the symphysis anteriorly, against the arcus tendinues fasciae and arcus tendineus of the levator ani muscles bilaterally and against the sacrum posteriorly.

intravaginal lesions due to pressure necrosis

The anterior vagina wall and bladder/urethra are more at risk than the posterior vagina wall and rectum; also the lateral vagina walls, levator ani muscles, cervix, uterus and deeper pelvic structures (nerves, ligaments, blood vessels, periost etc) are at risk.
Therefore an isolated vesicovaginal fistula (VVF) is found in 85% of the patients, a combination of VVF with rectovaginal fistula (RVF) in 12-15%, whilst an isolated RVF is uncommon except for sphincter ani rupture with distal anorectum trauma.

vesicovaginal fistula

In case of VVF there is always tissue loss of the urethra and/or bladder, pubocervical (endopelvic) fascia and anterior vagina wall and/or cervix and/or uterus. There may be a urethrovaginal fistula, a vesicovaginal fistula, a vesicocervical fistula or a vesicouterine fistula, either isolated or in combination with each other; and there may be multiple fistulas. If the traumatized urethra is totally disrupted from the traumatized bladder (neck) there is a circumferential fistula or a urethrovesicovaginal fistula with a circumferential defect which is common. Urethra block of the proximal urethra opening is frequently found in circumferential fistulas since the traumatized urethra heals with scarring and obliteration.
In the vesicocervical and vesicouterine fistulas there may be (additional) trauma due to ruptured uterus with ruptured bladder and/or surgical trauma due to caesarean section. In the larger fistulas the bladder (base) may prolapse through the fistula opening into the vagina and eventually through the vulva to the outside. Also a wide open distal urethra + external urethra opening are frequent since the endopelvic fascia has been traumatized resulting in poor support for the urethra, especially if there is no longer connection of the endopelvic fascia to the paraurethra part of the arcus tendineus fasciae.
In 2-3 per thousand patients there is (sub)total loss of urethra and bladder, and the resulting fistula becomes inoperable.

ureter fistulas and other exceptional urine fistulas

Especially if a caesarean section has been performed and the woman is leaking urine together with spontaneous miction, there may be a ureter fistula as well. Exceptionally fistulas between the urinary tract and bowels may develop or between the bladder and the skin.

urine stress incontinence

Immediate postpartum urine stress incontinence is common with or without visible trauma to the anterior vagina wall over the urethrovesicovaginal junction; or as the spontaneous healing phase of an atonic bladder. Normally this may heal spontaneously by short-term catheter treatment followed by bladder drill. However, after 4-5 months no spontaneous healing can be expected, and an incontinence operation is indicated.

atonic bladder

The signs are overflow incontinence, suprapubic mass, anterior vagina wall bulging into the vagina and increased longitudinal bladder diameter; with or without visible trauma to the anterior vagina wall. Though there may be a neurogenic component, to be tested by the anal sphincter reflex, it is caused by extreme overstretching of the detrusor muscle fibers resulting in “breaking” of the fibers so that the detrusor muscle can not contract any longer. Spontaneous healing via urine stress incontinence is the norm which can be speeded up by catheter treatment for 4-6 weeks followed by bladder drill. However, duration of up to 4-5 years is regularly encountered which could be cured by catheter treatment for 8-10 weeks.

stricture of urethrovesical junction

This may develop if there has been a subfistulous trauma to the anterior vagina wall, bladder neck and proximal urethra resulting in scarring of anterior vagina wall and urethrovesical junction during the healing process. Dilatation and catheter treatment are indicated.

anterior vagina wall

Normally the trauma to the anterior vagina wall is larger than the trauma to the underlying fascia and bladder/urethra as found in fresh obstetric trauma. However, the anterior vagina wall heals faster than the fascia and bladder.

rectovaginal fistula

In case of RVF there is always tissue loss of the rectum, prerectal fascia and posterior vagina wall; in sphincter ani rupture there is always trauma (with or without tissue loss) to the internal and external anal sphincters, anorectum, prerectal fascia and perineal body; and there may be multiple fistulas. In proximal rectovaginal fistulas there is often a (severe) rectum stricture at the distal part which has to be disrupted during the repair otherwise the repair will be blown out. If the traumatized rectum is completely disrupted from the traumatized sigmoid there is a circumferential fistula or a rectovaginal fistula with circumferential defect which is rare. Complete closure of the distal loop with the rectum as a blind sac is possible in the circumferential fistulas. Exceptionally the trauma is so extensive that the fistula becomes inoperable.

However there is a strong tendency for small median proximal fistulas to heal spontaneously if there is no rectum stricture with outflow obstruction. Therefore the incidence of rectovaginal fistula is far higher than assumed.

sphincter ani rupture

Actually sphincter ani rupture is normally not caused by pressure necrosis but by precipitous passing/cutting through of the head of the baby through the vulva even if is combined with obstructed labor; only in few instances is it caused by pressure necrosis due to prolonged obstructed labor and then always in combination with a VVF and extensive other lesions. The sphincter ani rupture is normally anterior in combination with distal anorectum trauma and perineum rupture. However, seldomly a posterior sphincter rupture is found without distal anorectum trauma and perineum rupture; due to compression of the posterior sphincter ani against the coccyx.

In over 90% of the patients signs of additional surgical trauma are present as everybody tries to apply some sutures immediately post partum.

posterior vagina wall

Also the trauma to the posterior vagina wall is larger than the trauma to the underlying prerectal fascia and rectum as noted in fresh obstetric fistulas.

cervix and uterus

There may be tissue loss of the cervix, and (sub)total loss is frequently encountered sothat also the canal cannot be identified even though the patient is menstruating. If there is total obliteration of the cervical canal secondary amenorrhea with or without cryptomenorrhea is found.

Trauma to and tissue loss of the endometrium may lead to synechia and secondary amenorrhea, though (sub)total loss of the uterus is very rare; this is different from secondary amenorrhea due to excessive blood loss (SHEEHAN syndrome).

levator ani musculature

There may be variable amounts of tissue loss of the pubococcygeus, iliococcygeus and (ischio)coccygeus muscles along the arcus tendineus of the levator ani muscle. It is the cephalad part of these muscles with its origin the arcus tendineus of the levator ani muscles ATL which is affected whilst the caudad part with its insertion into levator plate and coccyx is still intact.

This is always found in the circumferential fistulas, and may frequently lead to a vagina stricture, mostly of the posterior and lateral vagina walls parallel to the ATL but also circular, at the distal edge of tissue loss at the junction with traumatized tissue which has “healed” with scarring and distal vagina stenosis.

If there is major loss of the levator ani muscle resulting in bare bones it does not make sense to instruct patients in the use of pelvic floor muscle exercises if they develop postrepair incontinence.

internal obturator muscle

Infrequently tissue loss of the internal obturator muscle + obturator membrane is such that the obturator foramen is “empty” and a finger can be passed through this foramen from the inside to the outside; this may interfere with exorotation of the hip joint and upper leg.

piriformis muscle

Theoretically there may be trauma to the piriformis muscle which may interfere with exoration of the hip joint as well.

pubic bones and pubic symphysis

If there is major tissue loss of the levator ani muscle (+ internal obturator muscle) this results in bare pubic bones with loss of pubic bone periost and pubic symphysis cartilage; though sometimes there is subtotal loss of the pubic symphysis cartilage complete symphysiolysis with dehiscence has not been encountered.

pubocervical = endopelvic fascia

There is always tissue loss of the pubocervical (endopelvic) fascia which may be combined with loss of other intrapelvic connective tissues and ligaments; in the circumferential fistulas the paraurethra arcus tendineus fasciae has been lost bilaterally as well.

The anterior part of the pubocervical fascia together with its bilateral connection to the paraurethra arcus tendineus fasciae secures/stabilizes the urethra in its anatomic position so that the urethra can exert its physiologic continence/closing action.

This mechanism has to be checked for systematically and if defective repaired with great care in order to prevent postrepair urine intrinsic/stress incontinence.

arcus tendineus fasciae and arcus tendineus of levator ani muscle

Trauma to the arcus tendineus fasciae and to the arcus tendineus of the levator ani musculature are frequently found since this is exactly along the pelvis inlet where the pressure is being exerted during prolonged obstructed labor. In extensive trauma both arci tendinei may be totally lost from paraurethrally up to the ischial spines.

If this is found it is always in combination with major loss of the pubocervical (endopelvic) fascia with major loss of the pubococcygeus, iliococcygeus and/or (ischio)coccygeus muscles.

pubourethral ligaments

Frequently there is tissue loss of the intermediate and posterior pubourethral ligaments whilst loss of the anterior pubourethral ligaments is seldom; if there is a circumferential fistula it may be total

broad, cardinal and sacrouterine ligaments

In extensive fistulas with circumferential defect there may be trauma to the broad, cardinal and sacrouterine ligaments resulting in prolapse of cervix and uterus. Here there is major tissue loss of the pelvic connective tissue combined with major loss of the pelvic muscular diaphragm resulting in an empty pelvis.

On the other hand trauma at the posterior inlet may lead to scarring with proximal fixation of the cervix onto its surroundings, especially after caesarean section, and then on cough the cervix moves cephalad towards the abdominal cavity; this mechanism may be responsible for breakdown after fistula repair.

sacrospinous and sacrotuberous ligaments

If the pressure is exerted at the posterior part of the pelvis inlet the sacrospinous ligament may be traumatized mostly at its junction with the ischial spine. Theoretically also the sacrotuberous ligament may be traumatized.

vascular and lymphatic tissue

In the urethrovesicovaginal fistulas with circumferential defect there is trauma to and loss of the prevesical vascular plexus and major hemorrhage is not encountered at circumferential dissection of the bladder from the symphysis; there must be trauma to other vascular structures and to the lymphatic tissues as well.

vagina stricture, stenosis, shortening and atresia

Tissue loss together with trauma of the intrapelvic soft tissues may “heal” by varying degrees of scarring resulting in varying degrees of vagina stricture, vagina stenosis, vagina shortening or even vagina atresia.

empty pelvis with bare bones

If there is (sub)total loss of the intrapelvic soft tissues, there is no tissue left to “heal” by scarring and an empty pelvis with bare bones is the result.

lesions of the vulva due to pressure necrosis

Tissue loss of the labia minora may be encountered, mostly the posteriolateral parts but also (sub)totally. Sometimes this is combined with tissue loss of the labia majora. It is definitely not due to circumcision which can be proven in the patients who come immediately after delivery with open lesions of the labia.

local extravaginal lesions due to immobilization or neurologic trauma

Because the patient is immobilized for a long time, pressure sores over sacrum, trochanter major, heel and scapula may develop in varying degrees of size and depth up to the underlying bone.

Therefore every effort should be made to mobilize the patient as soon as possible post partum.

Pressure ulceration over the ischial tuberosities may be found due to insensitivity if there is long-standing saddle anesthesia in case of pudendal nerve trauma.

neurologic lesions due to intrapelvic compression

intrapelvic sciatic/peroneal nerve trauma resulting in drop foot

The sciatic nerve or its lumbosacral plexus may be compressed between the hard fetal skull and bony maternal pelvis resulting in minor to total function loss of the peroneal nerve being part of the intrapelvic sciatic nerve.

Since the peroneal nerve is innervating the musculi tibialis anterior, extensor hallucis longus, extensor hallucis brevis, extensor digitorum longus, extensor digitorum brevis, peroneus longus, peroneus brevis and peroneus tertius this will result in (partial) atrophy of these muscles with weakness or loss of dorsiflexion and eversion of the foot.

In its extreme form the foot is in inversion/plantiflexion and if long standing the gastrocnemius muscle with Achilles tendon will shorten and contract especially when the patient is immobilized; in the end it will become a fixed inversion/plantiflexion contracture of the ankle if nothing is done.

The incidence of peroneal nerve trauma in the obstetric fistula is high since signs of it are found in over 85% of the patients who present within 3 months after childbirth; and therefore it should be part of the routine examination.

The degree of trauma is estimated by voluntary muscle testing VMT according to the Medical Research Council or MRC scale 0-5 whereby grade 0 = no function whatsoever, grade 1 = only a muscle twitch, grade 2 = minimal movement (active dorsiflexion of toes), grade 3 = active half-range dorsiflexion of foot if gravity is eliminated, grade 4 = active full-range dorsiflexion of foot with minor muscle weakness, and grade 5 = normal.

The gait is severely affected in grades 1-2(-3) which will produce the typical drop foot walking.

Since we cannot influence nerve healing we can only wait for spontaneous recovery or improvement which may take up to 2 years and occurs in over 90% of the patients. Active muscle exercises by immediate mobilization/walking, with or without a stick, will prevent major muscle atrophy and major contracture of the gastrocnemius muscle with Achilles tendon.

Probably there is anesthesia of the anterioateral and dorsolateral aspects of the lower leg and foot as well but we have not been testing this by sensitivity testing ST since we do not encounter ulceration of these areas.

There may be trauma to the other parts of the sciatic nerve as well though this has not been systematically examined.

pudendal nerve/sacral plexus trauma

The sacral plexus may be compressed between the hard fetal skull and maternal bony pelvis resulting in: a. atonic bladder with overflow incontinence with leaking urine, b. minor or major stress incontinence with leaking urine, c. sphincter ani paralysis with stool/flatus incontinence, d. saddle anesthesia of vulva/perineum/buttocks and eventually ulceration due to anesthesia.

Therefore routine examination of the obstetric fistula patients should include measuring bladder capacity, testing of anal sphincter reflex and, if this is negative, sensitivity testing ST of vulva/perineum/buttocks for saddle anesthesia.

Though sacral plexus trauma is regularly encountered immediately following obstructed labor, usually it heals spontaneously and most patients have no complaints after 4-6 weeks. However, rarely patients are encountered who have the combination of all these lesions longer than 2-3 yr and then we have nothing to offer.

anesthesia of the vagina

This is more or less a physiologic phenomenon during childbirth and lasts some 4-6 weeks afterwards probably due to trauma to the already sparse nerve endings in the vagina walls. This explains why in a selected group of patients primary suturing can be performed; with excellent results.

neurologic lesions due to eclampsia

stroke (cerebrovascular accident)

Though actually not caused by obstructed labor 4 **teenage** patients were treated who had an obstetric fistula and had experienced a stroke due to hypertension (eclampsia) during obstructed labor resulting in fascialis paresis with slurred speech and contralateral paresis of the limbs; their recovery was very slow and incomplete.

transient blindness

A 15-year-old girl was treated by catheter at 14 days post partum with an obstetric urine fistula and severely impaired vision due to eclampsia which recovered spontaneously over the 6 weeks of treatment; this seems to be not uncommon in young patients with eclampsia in northern Nigeria.

systemic lesions due to the enormous trauma of prolonged obstructed labor

Poor general health and even cachexia may be encountered which is due to the amount of energy consumed from which some patients even die post partum; high-protein alimentation is necessary.

Severe anemia is frequently found and then oral or systemic hematinics are indicated; patients may die from this as well post partum.

If there is excessive blood loss secondary amenorrhea may develop (SHEEHAN syndrome).

fistula amenorrhea

Fistula-related secondary amenorrhea, either due to local endometrium trauma, obliteration of cervical canal or endocrinologically, is found in only 12-15% of the patients if the fistula duration is one year or longer. Cryptomenorrhea may be found if there is total obliteration of the cervical canal.

lesions due to continuous urine leakage

In almost all patients ammonia dermatitis around the vulva develops due to the continuous leaking of urine. In some patients it may be very aggressive and if long-standing it may be leather like. Causal treatment is by closure of the fistula and if necessary treatment of the postrepair incontinence.

lesions due to restriction of oral fluid intake
If the urine leakage lasts for some time the woman restricts her fluid intake which may result in repeat ascending urinary tract infections with in the end a shrunken bladder and she may also develop stones in the bladder and/or vagina. As well the offensive odor becomes worse whilst urosepsis is rare. Ascending urinary tract infections may lead to hydroureters, though this is a rare finding during operation, and to impaired kidney function.
Therefore it is of utmost importance to rehabilitate the patient in abundant drinking otherwise nothing can be done for her.

sex/condition of the infant born
The male:female sex ratio is 2:1 which can only be partly explained by the heavier weight of the male infant. However, there must be another mechanism involved which eludes the author.
The trauma of obstructed labor is such that 94% of the infants die inside the mother or immediately upon birth.

social implications
In case of VVF there is continuous leakage of urine which cannot be stopped or cleaned. The urine wetting of clothes, legs, bed, chair and floor with an offensive odor are unacceptable in any society since anybody can see and smell it, and the patient can not participate in normal social activities.
In case of RVF there is intermittent passing of stools and flatus per vaginam (unless diarrhea) which can be cleaned. Therefore these patients can participate in social activities, though with a handicap; several patients even deny it and do not want an operation.
The far reaching social implications of the obstetric fistula are such that the patient is being divorced by her husband and ostracized from her community, her friends and in the end even from her own family. The only ways to survive are by begging and commercial sex, and the woman has to live as an outcast with progressive downgrading physically, socially, emotionally and mentally if nothing is done.
Therefore one has to concentrate on the most important thing, viz. closure of the fistula, in order to rehabilitate the patient into her own family and society

discussion
There is an immense variety not only of the trauma to the bladder and/or rectum leading to a fistula but also of the additional trauma to other intrapelvic structures such as connective tissue, ligaments, muscles, blood vessels, lymphatic vessels and the vagina walls; and of the surgical trauma from previous repairs. Theoretically the trauma of prolonged obstructed labor may result in tissue loss ranging from one cell to (sub)total loss of all the intrapelvic soft tissues.
There are intravaginal, local extravaginal, neurologic, urine-induced and systemic lesions in an immense variety, either isolated or in total combination. There are no identical fistulas and each fistula constitutes a unique entity in need of its own specific customized approach.
Though the medical aspects of the obstetric fistula are already heart breaking, the far reaching social implications constitute a disaster especially considering the fact that in northern Nigeria 70% of the patients are younger than 20 years and have their whole adolescent and adult life in front of them; 40% of the patients are even younger than 16 years.

In order to plan and execute obstetric fistula surgery it is of utmost importance to examine the patient systematically and to assess all the different lesions pre- and intraoperatively. Special attention has to be given to the involvement of the urine continence/closing mechanism, since closure of the fistula is only effective if the patient becomes continent as well.

conclusion

The obstetric fistula constitutes a complex trauma with an immense variety, theoretically from one cell loss to total loss of the different intrapelvic structures in combination with local extravaginal lesions, neurologic lesions, urine induced lesions and systemic lesions, with far reaching social implications: a medical calamity and social disaster.

Therefore the repair of an obstetric fistula may be “simple”, difficult, highly complicated or even impossible, and requires thorough theoretical knowledge of and ample practical experience in the obstetric fistula and profound understanding of the urine continence/closing mechanism and pelvic (floor) anatomy in the female together with expert surgical skills. Actually there are no simple repairs; it only may look “simple” in the hands of the few highly experienced fistula surgeons.

Though normally something can be done, in its extreme form the woman ends up with a cloaca in an empty pelvis for which nothing can be done and she is crippled for life physically, socially, emotionally and mentally and she will never again be a normal woman.

to learn a trick is not enough

one needs full understanding of the anatomy and physiology

one has to know exactly what has been lost

only then

with expert surgical skills

one may be able to handle the obstetric fistula

with care

to full satisfaction of

the patient and the surgeon

fig 13 type I fistula

fig 14 closed

fig 15 type IIAa fistula

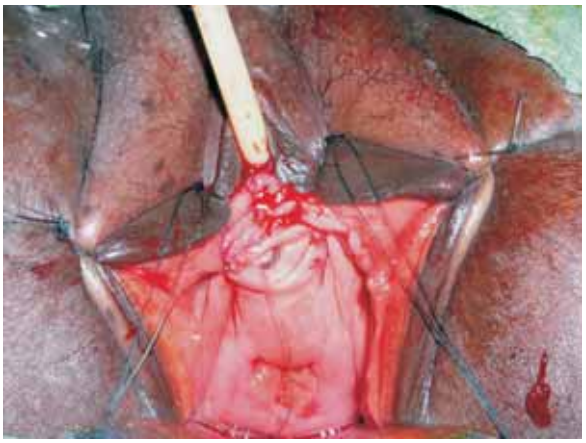


fig 16 closed

fig 17 type IIAb fistula

fig 18 closed

fig 19 type IIBa fistula

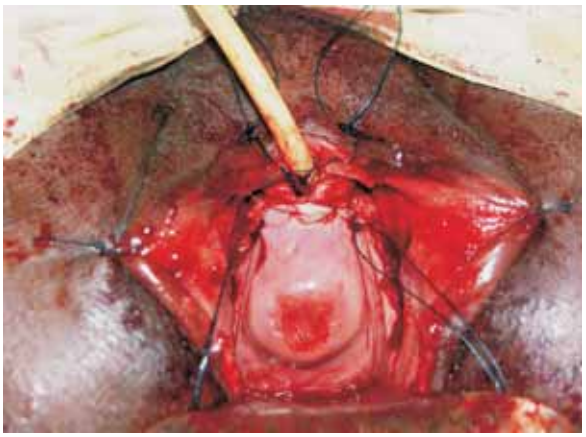


fig 20 closed

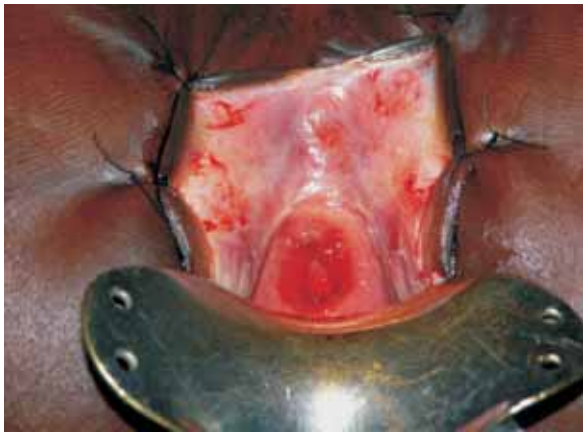


fig 21 type IIBb fistula

fig 22 closed

fig 23 bladder base prolapse

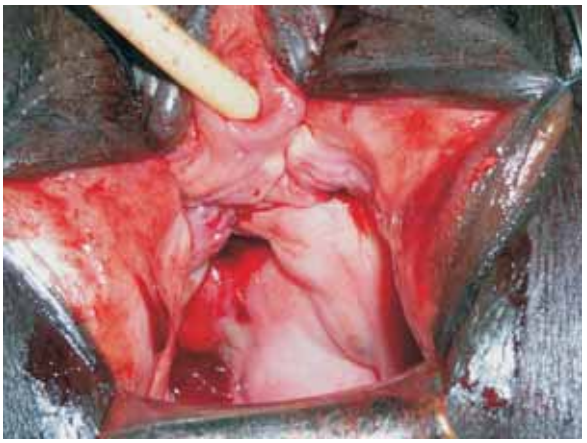


fig 24 closed

pre-, intra- and postoperative management of VVF

the better the organization of the preoperative preparation, of the operation theater and of the postoperative care **the better the outcome of fistula surgery** in terms of closure and continence and **the better the chance of social rehabilitation**
however, it cannot be stressed enough that the weakest point of fistula surgery in the developing world is the poor nursing care

first visit of patient
- extensive history
- clinical check-up; with vaginal examination
- special attention to other lesions due to obstructed labor: ulcers, drop foot etc

preoperative preparation
- oral hematinics and high-protein diet; **no antibiotics**
- **high oral fluid intake of at least 6-8 liters per day already preoperatively!**
- full mobilization; if needed with stick

laboratory, blood bank and X-rays
- Hb/Ht and serum creatinine
- a blood bank is complicated
- X-rays are not indicated

examination
- normal vaginal examination at first visit and day before operation
- EUA (examination under anesthesia) is nonsense if it is not followed up **immediately** by surgery **in the same session**

timing of fistula management
- the management has to start the moment the leaking of urine is manifest
- if no healing by catheter then for early closure as soon as wounds are clean

equipment
- a well functioning hydraulic operating table with 60° inclination is a must

special surgical instruments
- self-retaining weighted AUVARD speculum, long vaginal instruments, sharply curved THOREK scissors, sharp DESCHAMPS aneurysm needle

suturing materials
- polyglycolic acid and nylon; expensive atraumatic suturing materials are not required

anesthesia
- spinal anesthesia with a long-acting agent, e.g. hyperbaric bupivacaine 0.5%

manpower

only the surgeon and one instrumentating operation theater nurse
one retractor inside the vagina is already a crowd

operation route

the vagina in type I through type IIBb fistulas; exceptionally and for type III fistulas other routes may be necessary

position on the operation table

exaggerated lithotomy position with the legs flexed and slightly abducted in the legholders

accessibility

by median, uni- or bilateral episiotomies

examination under anesthesia

this is done by any surgeon for whatever surgery **at the beginning of any operation**; the fistula is classified and a final decision taken how to tackle this specific fistula

classification of fistulas according to anatomic/physiologic location (**PhD study**)

- **I** not involving the closing mechanism
- **II** involving the closing mechanism
  - **A** without (sub)total urethra involvement
    - **a** without circumferential defect
    - **b** with circumferential defect
  - **B** with (sub)total urethra involvement
    - **a** without circumferential defect
    - **b** with circumferential defect
- **III** miscellaneous, e.g. ureter and other exceptional fistulas

further classification as to size

small	< 2 cm
medium	2-3 cm
large	4-5 cm
extensive	≥ 6 cm

this classification is based on the quantitative and qualitative amount of tissue loss of the continence/closing mechanism

type I tissue loss of bladder, pubocervical fascia and anterior vagina wall and/or cervix and/or uterus
intact continence/closing mechanism

type IIAa tissue loss of bladder, urethrovesical junction, trigonal ring, detrusor loops, proximal-(mid) urethra, pubocervical fascia and anterior vagina wall (and cervix and/or uterus)
minor involvement of continence/closing mechanism

type IIAb circumferential tissue loss of bladder neck, urethrovesical junction, trigonal ring, detrusor loops, proximal-(mid) urethra and tissue loss of posterior pubourethral ligaments, pubocervical fascia, anterior vagina wall/

cervix/uterus, pubococcygeus muscles, iliococcygeus muscles, ischiococcygeus muscles; also trauma to arcus tendineus fasciae, to arcus tendineus of levator ani muscles and even to internal obturator muscles with loss of pubic bone periost and symphysis cartilage
moderate to major involvement of continence/closing mechanism

type IIBa major tissue loss of urethra and tissue loss of urethrovesical junction, trigonal ring, bladder, detrusor loops, pubocervical fascia and anterior vagina wall (and cervix and/or uterus)
major involvement of continence/closing mechanism

type IIBb circumferential major tissue loss of urethra, urethrovesical junction, trigonal ring, bladder neck, detrusor loops and tissue loss of posterior and intermediate pubourethral ligaments, pubocervical fascia, anterior vagina wall (cervix and/or uterus), pubococcygeus muscles, iliococcygeus muscles, ischiococcygeus muscles; also trauma to arcus tendineus fasciae, to arcus tendineus of levator ani muscles and even to internal obturator muscles with loss of pubic bone periost and symphysis cartilage
extensive involvement of continence/closing mechanism

the operation in order to close the fistula and to restore continence becomes progressively more complicated from type I thru type IIBb whilst the prognosis as to closure and continence worsens progressively; the same applies from small thru extensive

surgical objectives
close the fistula
make the patient continent

operation: meticulous water-tight closure of bladder/urethra whilst only adaptation or half-open closure of anterior vagina wall
type I: only closure
type IIAa: closure and something has to be done about continence
type IIAb: circumferential repair by end-to-end vesicourethrostomy
type IIBa: (repair) + urethra reconstruction with functional urethra tissue
type IIBb: (circumferential repair) + urethra reconstruction with other tissue (scar tissue, paraurethra tissue, bulbocavernosus muscle or bladder); often in two stages
type III: ureter reimplantation or something else

pubocervical fascia
any defect has to be repaired meticulously and if necessary it has to be (re) fixed to the paraurethra arcus tendineus fasciae

the MARTIUS fibrofatty pad graft
does **not** contribute either to closure or to continence

indwelling bladder catheter for minimum period of 2 weeks
FOLEY catheter Ch 18

postoperative fluid intake

at least **6-8 liters per day** in order to get good urine flow with **urine output** of minimally **4,000-6,000 ml per 24 hr**

vagina pack

no routine vagina pack; good check on hemostasis

antibiotics

only on strict indications, e.g. pneumonia

mobilization

full mobilization the morning following surgery

main postoperative problem when the fistula is closed

stress and/or urge incontinence

so already at first attempt make sure the right technique is performed

postoperative stress incontinence

urethralization and anterior fasciocolposuspension

postoperative urge incontinence

only strict bladder drill

urethrovesical junction (or UV)-stricture with overflow

daily gentle dilatation for 2 weeks; eventually combined with urethrotomy

social rehabilitation

only by successful repair; then it takes place spontaneously

future subsequent pregnancies/deliveries

regular antenatal care with delivery in hospital by cesarean section since labor assistance/monitoring is very poor in most instances

dye test with gentian violet

whenever in doubt (fistula?, incontinence?, which type of incontinence?) instill 20-200 ml gentian violet into the bladder under the motto **the dye no lie**

do not waste time, energy and money on things which make no sense such as EUA, first treating the urine dermatitis, intravenous pyelography, urine examination, waiting 3 months after delivery before surgery etc.

concentrate on the most important thing: close the fistula

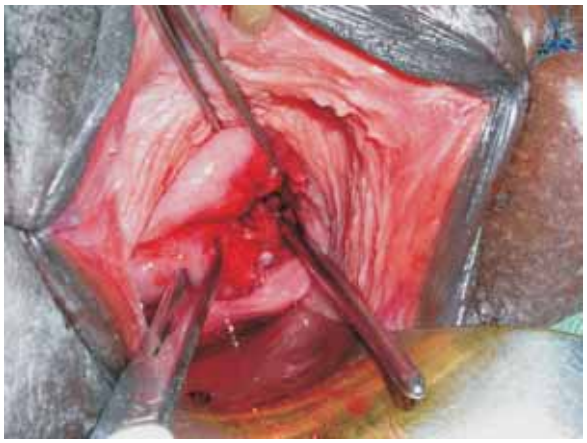


fig 25 ureter fistula

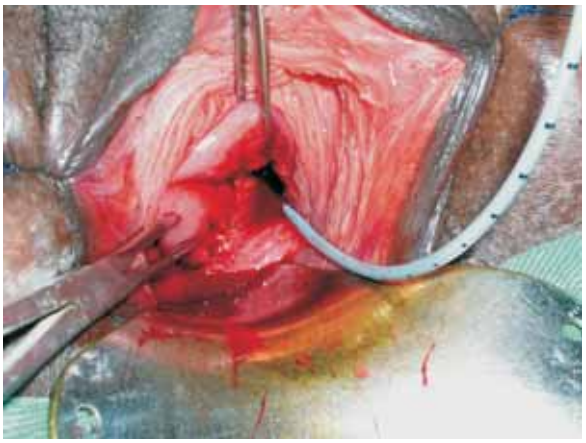


fig 26 catheterization

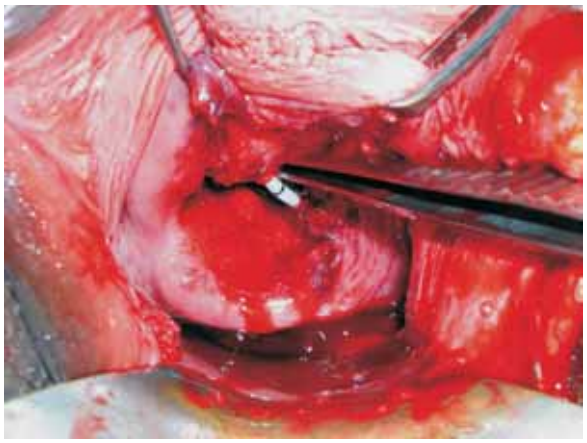


fig 27 bladder opened; catheter routed

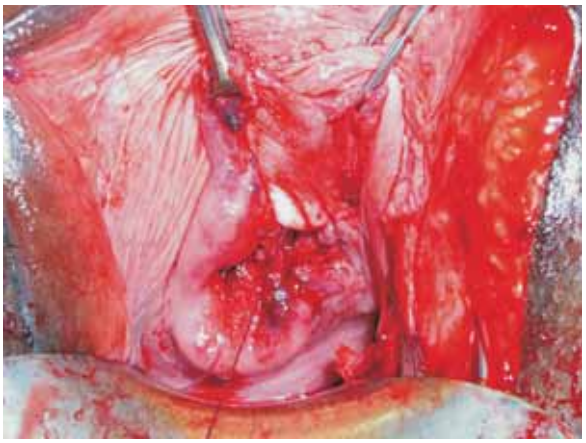


fig 28 bladder closed; os inside bladder

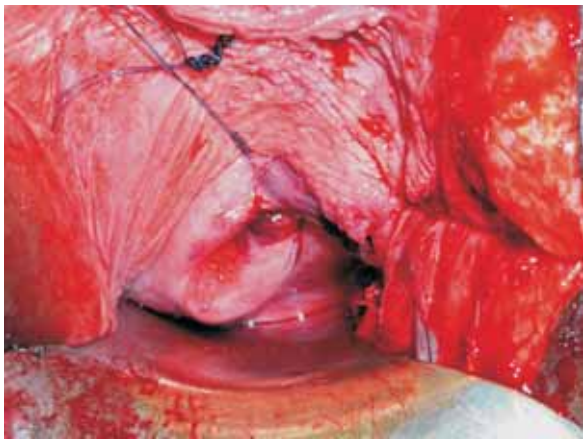


fig 29 cervix adapted

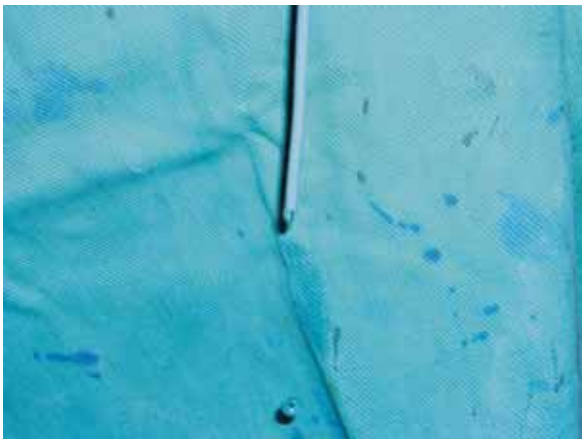


fig 30 ureter catheter functioning

fig 31 drop foot

fig 32 stroke

fig 33 anal reflex negative with stool incontinence

fig 34 saddle anesthesia

fig 35 „healed“ ulcers

fig 36 long-standing saddle anesthesia

classification of the obstetric urine fistula

as based on tissue loss, operation technique and outcome

introduction

The variety of the complex trauma of the obstetric fistula is immense, from a minute urine fistula with minimal tissue loss to a cloaca in an empty pelvis with extensive intravaginal lesions and (sub)total loss of the intrapelvic soft tissues, neurologic lesions such as drop foot, extravaginal lesions such as bedsores and loss of labia, urine-induced ammonia dermatitis and stones, and systemic lesions such as severe anemia and even cachexia.

The lesions are due to intravaginal pressure necrosis, intrapelvic compression of deep structures, immobilization, continuous urine leakage, blood loss and the amount of metabolic energy consumed during prolonged obstructed labor which may last from 2 to 7 days or even longer. Added to this may be the trauma of harmful practices by the traditional birth attendant or potentially harmful practices by professionals such as craniotomy, vacuum delivery, forceps delivery and cesarean section.

Therefore the repair of an obstetric urine fistula may be “simple”, difficult, highly complicated or even impossible, and requires thorough theoretical knowledge of and ample practical experience in the obstetric fistula and profound understanding of the urine continence/closing mechanism and pelvic (floor) anatomy in the female together with expert intravaginal surgical skills.

In order to plan and execute the fistula repair according to the principles of reconstructive surgery and to compare the results and different operation techniques it is important to have a scientific classification which makes sense.

Based on a retrospective analysis in 775 consecutive patients a scientific classification was developed and recommended in a **PhD thesis** in 1989. This classification has been used prospectively and refined by the author in over 18,000 personal fistula repairs and related operations during a 24-year period of (surgical) management of the obstetric fistula mainly in Nigeria, but also in Burkina Faso, Ethiopia, Kenya, Niger and Tanzania from 1984 up till today.

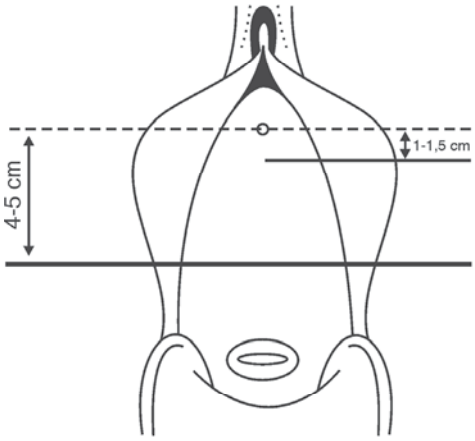
Right from the beginning the whole management has been pain-stakingly documented by computerized operation reports including history and schematic drawings complete with intermediate and final postoperative check-ups as evidence-based results; for each patients some 100-150 relevant data are available to support the continuous prospective research.

classification

The following classification is presented according to the anatomic/physiologic location with consequences for operation technique and prognosis: type **I** fistulas not involving the continence/closing mechanism, type **II** fistulas involving the continence/closing mechanism and type **III** miscellaneous, see Figures 1-2 and Table I.

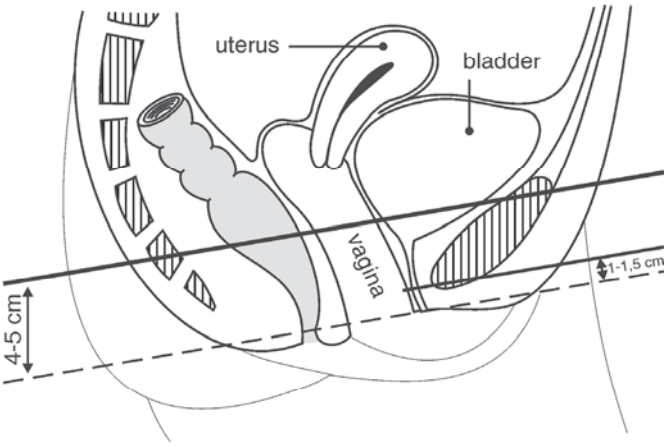
Figures 1 and 2

figure 1



continence/closing mechanism: frontal

figure 2



continence/closing mechanism: sagittal

Table I

classification of fistulas according to anatomic/physiologic location

I fistulas not involving the continence/closing mechanism

II fistulas involving the continence/closing mechanism
- **A** without (sub)total urethra involvement
  - **a** without circumferential defect
  - **b** with circumferential defect
- **B** with (sub)total urethra involvement
  - **a** without circumferential defect
  - **b** with circumferential defect

III miscellaneous, e.g. ureter fistulas and other exceptional fistulas

This classification is based on the progressive quantitative and qualitative amount of tissue loss of the continence/closing mechanism. The transition from type I into type II fistulas is at 4-5 cm whilst the transition from type IIA into type IIB fistulas is at 1-1.5 cm from the external urethra opening.
In **type I** fistulas there is only tissue loss of the bladder, pubocervical fascia (= endopelvic fascia) and anterior vagina wall and/or cervix and/or uterus with an **intact** continence/closing mechanism. There may be major tissue loss with also trauma to the sacrospinous ligament, (ischio)coccygeus muscles and pririformis muscles. However, the urethra, urethrovesical junction and anterior part of the pubocervical fascia together with its connection to the paraurethra symphysis and to the paraurethra arcus tendineus fasciae are still intact.
In **type IIAa** fistulas there is tissue loss of the bladder, urethrovesical junction/trigonal ring, detrusor loops, proximal-(mid) urethra, pubocervical fascia and anterior vagina wall (and cervix and/or uterus) with **minor to moderate** involvement of the continence/ closing mechanism. There may be slight trauma to the arcus tendineus fasciae (ATF), arcus tendineus of the levator ani muscle (ATL) and levator ani musculature. There may be a transverse defect in the fascia so that its direct connection to the paraurethra symphysis and paraurethra ATF is disrupted or weakened but the ATF itself is more or less intact; and so is the ATL.

In **type IIAb** fistulas there is circumferential tissue loss of the bladder neck, urethrovesical junction/trigonal ring, detrusor loops, proximal-(mid) urethra and tissue loss of posterior pubourethral ligaments, pubocervical fascia, anterior vagina wall (and cervix and/or uterus), ATF, ATL, pubococcygeus muscles and iliococcygeus muscles; also there may be even trauma to the internal obturator muscles, obturator membrane and (ischio)coccygeus muscles with eventual loss of pubic bone periost and pubic symphysis cartilage with **moderate to major** involvement of the continence/closing mechanism.
There is no functional tissue connection whatsoever between the traumatized urethra or what is left of it and the traumatized bladder (neck) whereby the urethra has retracted distally and the bladder proximally in opposite directions. This distal and proximal retraction is limited by the fact that the anterior urethra is loosely fixed to the posterior symphysis and that the anterior bladder is loosely fixed to the posterior symphysis and anterior abdominal wall; however, sometimes the bladder has slipped above the cephalad brim of the pubic symphysis.
The stabilizing support of the pubococervical fascia needed for the physiologic urethra continence/closing function has been lost since there is no connection whatsoever between what is left of the traumatized pubocervical fascia and the paraurethra symphysis; viz. the anterior part of the endopelvic fascia together with the paraurethra part of the ATF are completely lost.
For a good understanding it is the cephalad part of the levator ani muscle together with its origin ATL which is lost whilst the caudad part with its insertion into the levator plate and coccyx is still intact.
If there is major loss of the levator ani musculature the result is an empty pelvis with bare pubic bones; this is always combined with total loss of the ATF and ATL from paraurethrally up to the ischial spine.
In **type IIBa** fistulas there is major tissue loss of the urethra and tissue loss of the urethrovesical junction/trigonal ring, detrusor loops, bladder, pubocervical fascia and anterior vagina wall (and cervix and/or uterus) with **major** involvement of the continence/closing mechanism. Though there is tissue loss of the anterior part of the pubocervical fascia, the ATF, ATL and levator ani musculature are intact though the connection of the fascia onto the immediate paraurethra symphysis may be lost.
In **type IIBb** fistulas there is (sub)total circumferential tissue loss of the urethra, urethrovesical junction/trigonal ring, bladder neck, detrusor loops and tissue loss of the intermediate and posterior pubourethral ligaments, pubocervical fascia, anterior vagina wall (and cervix and/or uterus), ATF, ATL, pubococcygeus muscles and iliococcygeus muscles; also there may be even trauma to the internal obturator muscles, obturator membrane and (ischio)coccygeus muscles with eventual loss of pubic bone periost and pubic symphysis cartilage with **extensive** involvement of the continence/closing mechanism.
There is no functional tissue connection whatsoever between what is left of the severely traumatized urethra if anything is left at all and the bladder (neck) whilst the bladder has retracted proximally which is limited anteriorly by the loose fixation of the anterior bladder onto the posterior symphysis and anterior abdominal wall.
The anterior part of the endopelvic fascia has been lost completely together with bilateral loss of the paraurethra part of the ATF; in extensive trauma there may even be complete bilateral loss of the ATF from paraurethrally up to the ischial spine.
The cephalad part of the pubococcygeus muscle has been lost with total loss of the paraurethra ATL; in extensive trauma also the cephalad part of the ilioccygeus muscle is lost with complete loss of the ATL from paraurethrally up to the ischial spine.
Normally there is very extensive tissue loss which makes the surgical management so complicated in these fistulas; frequently an empty pelvis is found with bare pubic bones and sometimes the fistula may be inoperable right from the beginning.

Though in type IIAa and type IIBa there is tissue loss of the pubocervical fascia and there may be trauma to the levator ani muscle, ATF and ATL, in type IIAb and type IIBb there is total loss of the anterior part of the pubocervical fascia together with total bilateral loss of the paraurethra part of the ATF and total bilateral loss of the cephalad part of the pubococcygeus muscle together with total bilateral loss of the paraurethra part of the ATF and ATL; in extensive type IIAb and IIBb fistulas the ATF and ATL are completely lost bilaterally.
The **type III** fistulas are a class of its own, e.g. ureter fistulas or fistulas between the bladder and bowels or between the bladder and skin.

An additional classification is presented according to the fistula size: small, medium, large and extensive, see Table II.

Table II
classification of fistulas according to size

small	< 2 cm
medium	2-3 cm
large	4-5 cm
extensive	≥ 6 cm

principles of surgical technique(s)
The vaginal approach is the route of choice with or without unilateral, median or bilateral episiotomies, spinal anesthesia is the anesthesia of choice and the (exaggerated) lithotomy position is the position of choice for type I thru type IIBb fistulas; however, type III fistulas may need a different approach.
The fistula is classified by careful inspection and systematic examination of the complex obstetric trauma under spinal anesthesia just before the surgery is started and a final decision taken how to handle that specific fistula.
An incision is made at the fistula edge, in the large(r) fistulas an effort has to be made to identify and catheterize the ureters, a dissection of the bladder and/or urethra performed and the bladder/urethra closed without tension by one layer of inverting polyglycolic acid sutures taking good bites. The principles of reconstructive surgery and common sense dictate the direction of closure: longitudinal, transverse or oblique. A FOLEY Ch 18 catheter is inserted and, after checking watertight closure, the anterior vagina wall is only adapted or half closed to allow free spontaneous evacuation of small blood clots, tissue debris and bacteria according to the principles of septic surgery.
In type I fistulas this is the straightforward procedure, though in the vesicocervicovaginal fistulas and vesicouterovaginal fistulas the bladder has to be dissected from the cervix and/or uterus. Once the fistula has healed the patient will be continent as well since the continence/closing mechanism is not involved, unless she was already incontinent before she developed the fistula. It has the best chance of healing and continence.
In the type II fistulas also something has to be done about (reinforcing) the continence/closing mechanism, preferably during the repair or later if the patient develops incontinence. The circumferential fistulas need a circumferential dissection, advancement of the bladder and circumferential repair by an end-to-end vesicourethrostomy.
In type IIAa fistulas the anterior vagina wall is dissected from the bladder and urethra, and an effort made to restore the urethrovesical junction whilst care has to be taken to repair the pubocervical fascia for good urethra support. If there is a transverse defect in the fascia or if it is loose it should be fixed as well onto the paraurethra symphysis and intact paraurethra ATF. Since the continence/closing mechanism is involved there is a slight chance the patient will become incontinent after successful closure depending upon the amount of tissue loss.

In type IIAb fistulas there is total disruption of the traumatized urethra from the bladder (neck). In order to perform a complete (circumferential) restoration of the urethrovesical junction, it is necessary to dissect the bladder circumferentially from the anterior vagina wall, pubic bones and posterior pubic symphysis and if necessary also from the anterior abdominal wall. Then the bladder is advanced and the anterior and anteriolateral bladder walls are anchored onto the caudad posterior symphysis and distal anterior urethra by 3-5 polyglycolic acid sutures. The operation is further completed as an end-to-end vesicourethrostomy followed by bilateral refixation of the pubocervical fascia onto the paraurethral symphysis where the lost arcus tendineus fasciae used to be. Since there is circumferential tissue loss, circumferenetial dissection and circumferential repair the closure rate and the continence rate are slightly worse than in type IIAa fistulas.
In type IIB fistulas (part of) the urethra has to be reconstructed (in addition to bladder closure in large fistulas), preferably during the first repair or if that is not possible as a second stage. Since the most important part of the continence/closing mechanism is situated in the urethra the chance of becoming incontinent after successful closure is higher than in type IIA fistulas.
In type IIBa fistulas the urethra is reconstructed longitudinally by a single layer of interrupted polyglycolic acid; urethra tissue has retracted bilaterally and this (para)urethra tissue is used for the reconstruction. Then the pubocervical fascia has to be fixed to the paraurethra symphysis and intact paraurethra arcus tendineus fasciae and the neourethra covered by a flap from the anterior vagina wall or from the labia. Therefore the closure rate is slightly worse than in type IIA fistulas; as well as the continence rate. However, functional urethra tissue is used for the reconstruction.
In type IIBb fistulas there is often extensive tissue loss with (sub)total tissue loss of the urethra. Therefore the urethra is reconstructed from non-urethra tissue: either by paraurethra tissue (bulbocavernosus muscle) if available, or by scar tissue or by bladder tissue; as well the bladder has to be dissected circumferentially and anchored to the caudad posterior pubic symphysis with an end-to-end anastomosis onto the neourethra; and then the pubocervical fascia has to be refixed to the paraurethra “arcus tendineus fasciae” and the whole repair covered by a flap from the anterior vagina wall or labia. Many times a two-stage approach is necessary. As first stage the bladder is advanced and anchored caudally onto the pubic symphysis and as second stage the urethra is reconstructed. There is a fair chance of breakdown and a 40-50% chance of developing intrinsic/stress incontinence if the repair has been successful.
With reference to postrepair stress incontinence it is of utmost importance to keep in mind that in type IIAb and type IIBb the anterior part of the pubocervical = endopelvic fascia is completely lost together with the paraurethral part of the arcus tendineus fasciae and that the cephalad part of the pubococcygeus muscle is lost together with the paraurethral part of the arcus tendineus of the levator ani muscle; the fascia has to be repaired/refixed meticulously.
Type III fistulas are a class of its own and need their own specific approach, e.g. ureter implantation into the bladder.
In principle there is progressively more tissue loss in fistulas from small thru extensive; however, there are extensive fistulas which have become small due to scarring, and this should be taken into account; so there are extensive small fistulas. Dissection becomes progressively more extensive, the operation progressively more complicated, and the results progressively worse from small thru extensive.
If the fistula repair breaks down, this residual fistula has to be operated according to the same principles as if it were the first attempt.
The operation principles with respect to bladder/urethra, pubocervical fascia and anterior vagina wall for the different types I thru IIBb have been summarized in Table III.

Table III

operation principles

type	bladder/urethra direction of closure	pubocervical fascia	ant vagina wall closure
type I	any according to common sense	no special measures	adaptation
type IIAa	transverse	transverse repair (+ fixation)	transverse adaptation
type IIAb	circumferential end-to-end	refixation	transverse adaptation
type IIBa	longitudinal (+ transverse) urethra tissue	fixation	flap
type IIBb	longitudinal + circumferential nonurethra tissue	refixation	flap

results

In 1,716 consecutively operated patients, a final check-up after first and/or final attempt was performed 5-6 months postoperatively. The patients were asked systematically about leaking, (in)continence and micturition and then vaginally examined for healing and continence. Then the final results were analyzed whereby the incontinence rate was calculated as part of the healed fistulas and not as part of the total number of patients, see Table IV.

Table IV

results as to fistula type in 1,716 consecutive early closure patients (1992-2001)

type	number	healed first attempt	final healing	incontinent
type I	243	238 (97.9%)	242 (99.6%)	1 (0.4%)
type IIAa	888	868 (97.4%)	888 (100%)	11 (1.2%)
type IIAb	366	333 (91.0%)	353 (96.4%)	30 (8.5%)
type IIBa	87	80 (96.4%)	86 (98.9%)	14 (16.3%)
type IIBb	132	114 (86.4%)	121 (91.7%)	59 (48.8%)

The results as to fistula healing at first attempt according to fistula type declined progressively from type I thru type IIBb fistulas; the same could be demonstrated for the fistula size from small thru extensive.

The continence rate of the healed fistulas declined progressively from type I thru type IIBb; the same could be demonstrated for fistula size from small thru extensive.

comments

This scientific classification is based on a systematic analysis of the enormous variety of pressure necrosis tissue loss due to prolonged obstructed labor with special emphasis on the progressive involvement of the urine continence/closing mechanism. It requires thorough theoretical knowledge of and ample practical experience in the complex trauma of the obstetric fistula, an exact knowledge of the (intra)pelvic anatomy and profound understanding of all the factors involved in the female continence/closing mechanism. So far it is the only classification where the amount of qualitative and quantitative tissue loss is related to type, operation technique and outcome.

Though this classification has been presented earlier, it is the first time that all the different anatomic structures involved are individually specified. It is also the first time that a surgical plan of action with specific principles for each type is presented together with the results as to healing and as to continence for each specific type in a large number of consecutive patients.

All these patients have been classified and operated by the author himself under the same conditions; the postoperative check-ups with auditing of the results as to healing and as to continence have been done in the beginning by the surgeon but later on by highly qualified staff who do not know the classification and who refer only the failures back to the surgeon.

Since obstetric fistula surgery is reconstructive surgery in order to overcome highly variable amounts of anatomic tissue loss, the more accurate the quantitative and qualitative amount of tissue loss is assessed at the beginning of the operation the more effective surgery can be executed.

The classification as to fistula type is the most important since each type has its own specific surgical principles for repair with definite consequences for healing and continence.

The classification as to fistula size should be considered as additional and overlapping since it has no consequences for a specific surgical technique, only for extent of operation, healing and continence, and a majority of type IIBa and IIBb fistulas are already large or extensive.

Though there is a direct relation between fistula type and operation principles, healing and continence depend upon other factors as well such as tissue quality, bladder capacity, urethra length etc. Therefore since 2005 at the end of the fistula repair healing and continence are predicted in percentage and this is written down in the operation report for even better evaluation.

Previous repair(s) do not influence the outcome as to closure though they may influence the outcome as to continence since more scar tissue. Far more important are the original qualities of the fistula which in the first place may be responsible for the breakdown, and who operated and how she was operated.

A concomitant rectovaginal fistula, scar-tissue bands of the vagina, vagina stenosis/shortening, trauma to the piriformis muscle or trauma to the sacrospinous or sacrotuberous ligaments do not influence the classification, the operation technique or the outcome; at least not in the author's experience since the principles of reconstructive surgery and of septic surgery are strictly adhered too.

Since the pubocervical fascia (= endopelvic fascia) plays a crucial role in maintaining continence by securing/stabilizing the urethra in its anatomic position, it is of utmost importance to repair any defect in it and if necessary to (re)fix it bilaterally to the paraurethra symphysis and paraurethra arcus tendineus fasciae.

Type III fistulas are a class of its own with a different surgical approach though normally with excellent results as to closure and continence.

With this classification it is possible to plan and execute the fistula repair according to the principles of reconstructive surgery and to compare the results and operation techniques in a scientific way.
However, since the variety is so immense and there are no sharp demarcations but fluid transitions between the different types, this classification should be used as a comprehensive guideline. Each fistula is a separate unique entity and needs its own specific customized approach, and that is exactly what makes obstetric fistula surgery so intriguing and challenging since there are no identical obstetric fistulas.
As well, considering the extent and variety of the complex trauma of the obstetric fistula it is good to realize that there are no simple fistula repairs; it only may look “simple” in the hands of the few expert fistula surgeons.

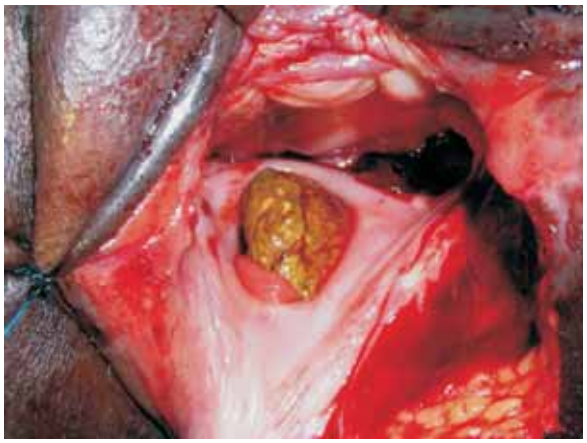


fig 37 rectovaginal fistula

fig 38 closed

fig 39 sphincter ani rupture

fig 40 reconstructed

fig 41 posterior sphincter trauma

fig 42 rectum prolapse

fig 43 sphincter ?reconstruction?

fig 44 sphincter reconstruction

fig 45 mutilating surgery

fig 46 episiotomy breakdown

fig 47 colostomy prolapse

fig 48 mutilating incision

importance of high oral fluid intake

the patients are highly intelligent and notice that when they drink plenty they will leak plenty and when they drink little they will leak little

so after some time, but especially when they have either long-standing fistula or long-standing (postrepair) urine stress incontinence, most of them will restrict their oral fluid intake to the minimum

however, that is one of the worst things that can happen since urine output will be minimal and the urine concentrated resulting in:

a. recurrent urinary tract infections with in the end a shrunken bladder
b. stone formation
c. severe urine dermatitis
d. offensive odor
e. more social outcast
f. they give up hope since it is difficult to get cured

to operate the patients in this stage is associated with problems and bad results such as high percentage of breakdown, cystitis, UV-stricture etc

therefore it is of utmost importance to rehabilitate the patient to start drinking ... and **abundant drinking** ... already before any repair is undertaken

they have to understand that they first have to leak more before they can be cured and this requires **patient compliance**

ultimately the patient is responsible for her own health and not the surgeon; **it is not possible to cure an uncooperative patient**

so the first thing in the management of the obstetric fistula is to explain and instruct the patient **to drink at least 6-8 liters per day** and make her understand that if she is **not drinking** there will be **no operation**

this will also help in the patient complying to drink postoperatively since she is already used to it; and during operation it might help in identifying the ureters

it is easy to check as one only needs the patient to stand for a couple of minutes and if no leakage tell her to come back if drinking

it will select the cooperative patients from the uncooperative patients; if the patient is uncooperative, do not operate; it is asking for trouble

theoretically there is a minimal risk of developing hyponatremia when the patient is not eating so on the operation day some salt is added to the water

postrepair stress incontinence
if the patient develops postrepair stress incontinence she is instructed on a strict bladder drill which consists of the following: under supervision abundant drinking and regularly trying to urinate every half an hour
by this simple regimen 60-80% of the patients become completely continent

you want to be dry ... you have to comply

immediate management of fresh obstetric fistulas

according to basic surgical principles
with prevention of the woman from becoming an outcast

catheter

any woman who starts leaking urine following childbirth should have an indwelling bladder catheter whatever the cause:
fistula, stress incontinence or overflow incontinence (atonic bladder)
by inserting a FOLEY catheter Ch 18 for a minimum of 4-6 weeks at least 15-20% of the fistulas will heal as well as stress/overflow incontinence

no antibiotics

since the fistula is caused by **pressure necrosis** and not by infection systemic antibiotics are not indicated routinely just as in burnwounds (thermal necrosis) and bedsores (also pressure necrosis)
only on specific indication, such as puerperal sepsis or pneumonia, antibiotics have to be given

oral fluid intake

a **minimum of 6-8 liters per day** in order to produce at least 4,000-6,000 ml of urine per 24 hr to keep the catheter open and to prevent ascending urinary tract infection

oral hematinics

fersolate and folic acid

high-protein diet

to speed up recovery from the enormous trauma of prolonged obstructed labor

slough/necrosis of larger fistulas

debridement of the slough as soon as possible like in other types of pressure necrosis (bedsores) or thermal necrosis (burnwounds); this is sound surgical practice
followed by regular thorough intravaginal cleaning of the vagina/wound by the patient herself using water/detergent

early closure

as soon as the fistula edge is clean an early closure is performed, unless the fistula has healed already by catheter; this is also sound surgical practice as it falls within the time of the physiologic wound healing processes

advantages

excellent success rate as to closure and to continence and thus **prevention of the woman/girl from becoming an outcast** with progressive downgrading medically, socially and mentally

the sooner this management is started the better the chance of complete cure

urine continence mechanism

in the female

it is good to realize that the most important part of the urine continence mechanism is located within the urethra whilst the continence potential is from trigonal ring and the proximal urethra thru the distal urethra and external urethra opening and shifts upon physiologic stress

I bladder neck
- **a** trigone
- **b** trigonal ring
- **c** the two detrusor loops

II urethra
- **A** mucosa seal and coaptation
  - **a** urethra mucosa
  - **b** submucosal vascular plexus
  - **c** longitudinal smooth muscle fibers
  - **d** circular smooth muscle fibers
  - **e** elastic and connective tissue of urethra wall

  these structures are estrogen influenced
  - **f** slow-twitch horseshoe-shaped striated muscle fibers; maintaining contraction and tonus over long periods of time
  - **g** fast-twitch horseshoe-shaped striated muscle fibers; reflex contraction just before sudden intraabdominal pressure rise
- **B** length and diameter
  - **h** length of urethra; if it is $\leq$ 1.5 cm continence becomes critical
  - **i** diameter of urethra: physical law: the smaller the circumference of a tube-like structure the stronger the centripetal forces

III anatomic/physiologic support of urethra and bladder neck
- **A** static
  - **a** pubourethral ligaments; suspension
- **B** dynamic
  - **a** elastic pubocervical fascia extending bilaterally into urethrovesicopelvic ligaments; for stabilization and hinge-like compression; actually the pubocervical fascia is part of the **endopelvic fascia**
  - **b** pubococcygeus musculature

IV intact innervation of these components

since there is **no sphincter muscle** and since the posterior urethra is firmly attached to the elastic pubocervical fascia there is no circular closure of the urethra but **coaptation of the anterior urethra against the posterior urethra** whilst additionally the elastic pubocervical fascia **compresses the urethra** against the posterior symphysis with a maximum against the caudad third of the posterior symphysis (hinge effect); the bladder neck keeps the urethra at full length and the urethrovesical junction closed; the nervous system is the coordinator
the pubocervical fascia secures and stabilizes the urethra in its anatomic position so that it can exert its physiologic function ensuring full continence

factor I keeps the urethrovesical junction closed; factors I, II and III keep the urethra stretched and the anterior urethra wall coapted against the posterior urethra wall whilst factor III stabilizes the urethra in its anatomic position and compresses it against the posterior pubic symphysis with a maximum at the mid-urethra; factor IV is the coordinator

at rest during the filling phase of the bladder these mechanisms maintain closure of urethrovesical junction and urethra; when the bladder fills up more these forces increase via impulses from baroreceptors

voluntary increase of these forces is possible by contraction of the pubococcygeus musculature with stretching of the pubocervical fascia and contraction of the fast-twitch striated muscle fibers of the urethra to postpone voluntary miction for a short period of time

at sudden intraabdominal pressure rise there is a reflex contraction of the pubococcygeus musculature with contraction of the fast-twitch muscle fibers and stretching of the pubocervical fascia maintaining the urethra stretched whilst its compression against the posterior pubic symphysis increases (hinge effect); this takes place a few milliseconds before there is an increase in intravesical pressure since first the diaphragm, the anterior abdominal musculature and the pubococcygeus musculature contract at cough and this causes intraabdominal pressure rise a few miliseconds later;
there is no pressure transmission involved keeping the urethra closed; how could it reach the urethra before reaching the bladder? and how would it close the urethra? as pressure exerted on a fluid is transmitted evenly in all directions
if these mechanisms are deficient, for whatever reason, stress incontinence develops

at urge incontinence there are involuntary contractions of the detrusor muscle without reflex increase in these forces setting involuntary miction in motion whilst voluntary increase in these forces is too weak and too short to stop miction

at the beginning of voluntary miction the two detrusor loops relax whilst the longitudinal detrusor muscle contracts with additional relaxation of the detrusor loops, the pubococcygeus musculature relaxes with relaxation of the fast-twitch muscle fibers of the urethra and with relaxation of the pubocervical fascia, the longitudinal smooth musculature of the urethra contracts whilst the circular smooth musculature and the slow-twitch muscle fibers relax resulting in urethra shortening with an increase in its diameter; so, the forces which close the urethra decrease whilst intravesical pressure increases and the urethra opens up from proximally, from the urethrovesical junction, towards distally, towards the external urethra opening and stays open during miction

at the end of miction the opposite takes place and the urethra stretches with a decrease in its diameter; so, the forces which close the urethra increase whilst intravesical pressure decreases and the urethra closes from distally, from the distal-mid urethra, towards proximally, towards the urethrovesical junction

there is no definite sphincter and pressure transmission is not involved

closure is by anterior to posterior coaptation and by compression

the pubocervical fascia secures/stabilizes the urethra in its anatomic position

urine incontinence

make sure to get the right diagnosis for a proper plan of action

true incontinence

fistula, ectopic ureters

stress incontinence

urine loss at intraabdominal pressure rise (cough, standing up etc.) from grade I (minor degree) to grade III (total incontinence); normal bladder capacity

intrinsic incontinence

total urine incontinence whilst lying/sitting//standing/walking as if there were a fistula since the intrinsic physiologic continence function of the urethra has been lost completely; normal bladder capacity

urge incontinence

urine loss not related to intraabdominal pressure rise but to involuntary detrusor contractions; small bladder capacity

overflow incontinence

a UV-stricture with outflow obstruction
b atonic bladder; large bladder capacity, bladder overfilled

bladder capacity may play a role in the outcome of the repair as to continence

on the one hand, if the bladder capacity is small urge incontinence may develop
on the other hand, if the bladder capacity is increased stress or overflow incontinence may be expected
the bladder capacity can be estimated according to the **longitudinal bladder diameter** as:

small	≤ 4 cm
moderate	5-6 cm
normal	7-12 cm
increased	> 12 cm

the longitudinal bladder diameter is calculated as: the distance from the external urethra opening to the bladder wall (as measured by a calibrated metal sound) minus the distance from the external urethra opening to the balloon of the FOLEY catheter (urethra length)

though measuring the bladder capacity in this way is not an absolute parameter, it will give a good impression of the bladder capacity; in addition metal sounding before the operation is started will detect bladder stones as well

as long as the forces which keep the urethra closed/sealed are higher than the intravesical pressure, there is no urine leakage, i.e. if there is no fistula

once the intravesical pressure exceeds the forces which close/seal the urethra there will be urine flow from the bladder through the urethra towards the outside

mechanism of intrinsic/stress incontinence

deficient pubocervical fascia is

no longer securing/stabilizing the urethra in its

anatomic position

resulting in distortion of the

urethra intrinsic continence mechanism anatomy

with loss of its physiologic function

fig 49 fistula + stone

fig 50 bladder stone

fig 51 suprapubic cystostomy

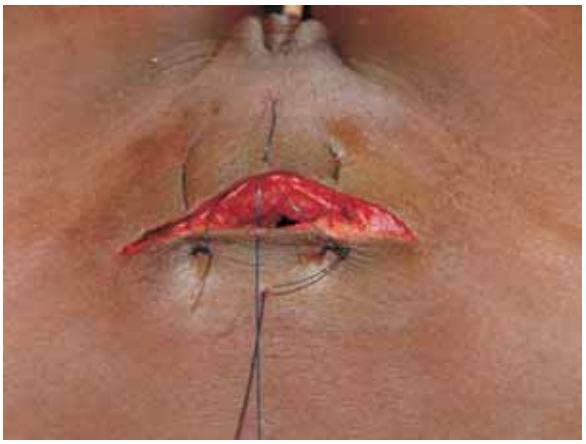


fig 52 wound adaptation

fig 53 to stop the urine leakage

fig 54 stone formation around plastic bag

fig 55 catheter treatment

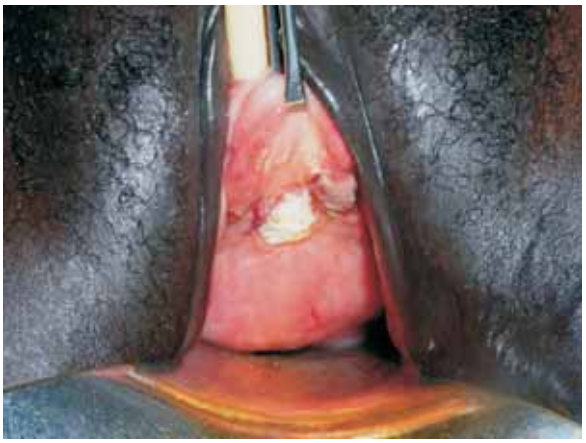


fig 56 spontaneous healing

fig 57 healing

fig 58 healed

fig 59 atonic bladder

fig 60 catheter for 6 weeks

total (post-repair) urine intrinsic/stress incontinence

urethralization by repair and/or (re)fixation of pubocervical fascia

introduction

One of the major problems in obstetric fistula surgery is the occurrence of total postrepair urine intrinsic/stress incontinence. Though the fistula has been closed the patient continues to leak urine whilst lying, sitting, standing and walking as if there still were a fistula since the intrinsic continence mechanism and the stress continence mechanism are not functioning. For the patient it is terrible since she and her community do not consider her as healed and she remains an outcast. For the surgeon it is frustrating since (s)he did a good job, however not good enough: repair successful but patient leaking.

The treatment of postrepair incontinence is even more complicated than that of genuine incontinence, since there is anatomic tissue loss of the intrinsic and stress continence mechanism. This tissue loss may involve the bladder neck, urethra, pubocervical fascia, pubourethral ligaments, trigonal ring, detrusor loops, pubococcygeus muscles, iliococcygeus muscles, ischiococcygeus muscles, arcus tendineus fasciae, the arcus tendineus of the levator ani muscles, and even the internal obturator muscles and the broad, cardinal and sacrouterine ligaments; it may be partial or total and can occur in complete combination. Added to the original trauma of pressure necrosis is the surgical trauma of the repair(s). Especially when what is left of the urethra is too short, i.e. $\leq$ 1.5 cm, it is difficult to provide a solution; and this short urethra is often wide open as well.

There are a complex of many factors (see: **urine continence mechanism in the female**) which determine if a woman is continent or not. However, there are only four factors which can be approached surgically at the moment: **a)** length of urethra, **b)** diameter of urethra, **c)** support of urethra and **d)** position of urethra in relation to the posterior pubic symphysis.

This operation technique aims to correct these four factors at the same time and in a physiologic way

mechanism of incontinence

Normally the anterior urethra is secured by the anterior pubourethral ligaments whilst the posterior urethra is secured by the intact pubocervical fascia. When the pubocervical fascia becomes deficient the posterior urethra wall is pulled inside whilst the urethra is anteriorly still secured resulting in distortion of the urethra muscular arrangement, the urethra opens up with opening of the trigonal ring whereby the proximal urethra becomes part of the bladder, i.e. vesicalization of the proximal urethra and then the urethra looses its physiologic continence/closing function.

operation technique

Under spinal anesthesia and in the exaggerated lithotomy position a FOLEY Ch 18 catheter is inserted, the bladder drained and the urethra length measured in cm by taking the distance from the external urethra opening to the balloon.

A transverse curved incision is made in the ruga folds with the tip at 1.5-2 cm from the external urethra opening, and the anterior vagina wall dissected from the underlying pubocervical fascia. A plication (rhaphy) of the urethra and pubocervical fascia is performed at 1.5-4 cm from the external urethra opening by interrupted polyglycolic acid sutures. The rhaphy is technically performed by multiple small superficial bites to avoid the ureters and the underlying urethra/detrusor muscle. If necessary the external urethra opening can be plicated by 1 polyglycolic acid suture as well. Then the pubocervical facia is (re)fixed onto the paraurethra arcus tendineus fasciae and onto the paraurethra

periurethral fascia by 2x polyglycolic acid sutures each side (with tightening of the fascia) in order to stabilize and secure the urethra in its anatomic position; many times nylon is used to achieve this picking up the fascia and the anterior vagina wall at one go. The result should be a proximal functional lengthening of the urethra by urethralization of the bladder neck, a narrow or normal-width urethra, a good fascia “plate” and a urethra secured and stabilized in its anatomic position. The bladder is filled by 150 ml of normal saline, the FOLEY catheter removed and the functional urethra length measured. Then it is checked if urine comes out of the external urethra opening at rest (instrinsic continence mechanism) and at cough with suprapubic pressure (stress continence mechanism). The FOLEY catheter is reinserted and fixed without ballooning.
The principles of the operation technique are demonstrated in drawings on opposite page.

postoperative care and check-ups

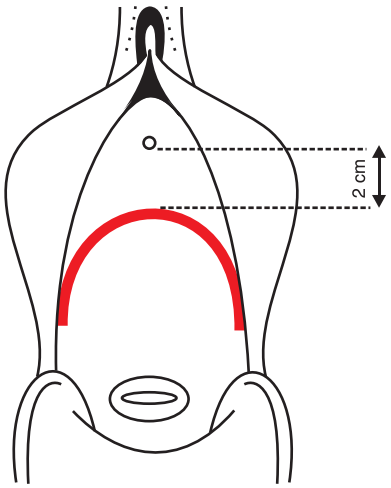
The FOLEY catheter is left in situ for 2 wk and the patient instructed to drink to get an oral fluid intake of 6-8 liters per day in order to produce at least 4,000-6,000 ml urine per 24 hr to keep the catheter open and to prevent ascending urinary tract infection. Antibiotics are not indicated unless the patient should develop a specific infection such as pneumonia. The patient is fully mobilized the day after operation.
Once the catheter is removed the patient is instructed to continue drinking and to pass urine every 10-15 min under supervision for 7 days.
At discharge from the hospital the patient is instructed to continue drinking and passing urine regularly, to refrain from sexual intercourse for 4-6 mth, to come regularly for check-ups and to come for removal of the nylon sutures after 6 mth at which time a final examination is made. She is also instructed to come at 3-mth amenorrhea and to go to the hospital as soon as labor pains start.

results

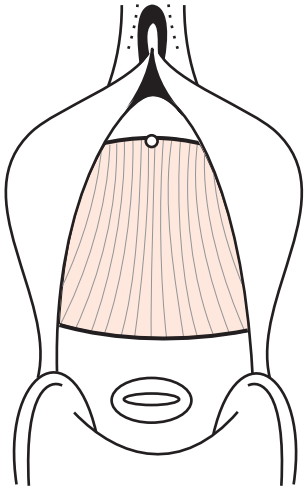
In Northern Nigeria out of some 450 patients operated so far, 85% were totally dry, in 10% there was sometimes slight urine leakage whilst standing and walking which did not bother them seriously, and 5% were still leaking continuously whilst lying, sitting, standing and walking.

discussion

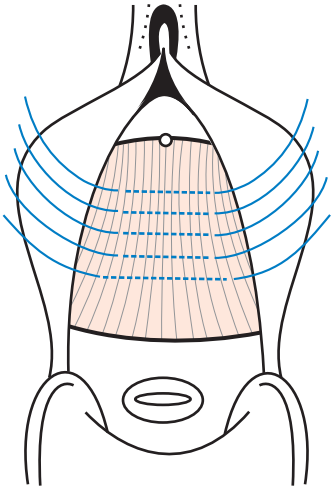
Urethralization by rhaphy and/or (re)fixation of the pubocervical fascia has become the standard technique in Northern Nigeria for total urine instrinsic/stress incontinence. At the beginning of the operation a meticulous evaluation has to be executed of what exactly is the problem: a loose defective fascia, no connection of the fascia onto the paraurethra arcus tendienus fasciae or both. According to the findings the whole technique or part of the technique has to be performed, It has highly promising theoretical and practical potentials. Even as a last resort it can be applied and if this fails then urinary diversion should be contemplated.



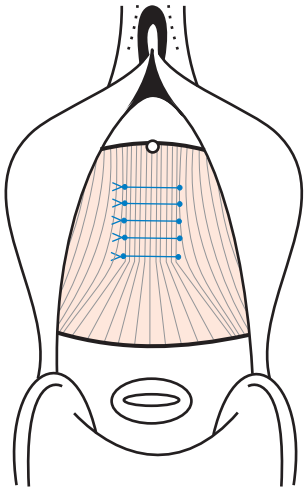
physiologic incision
anterior vagina wall



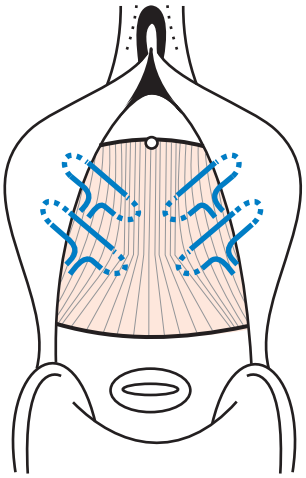
anterior vagina wall dissected
pubocervical fascia



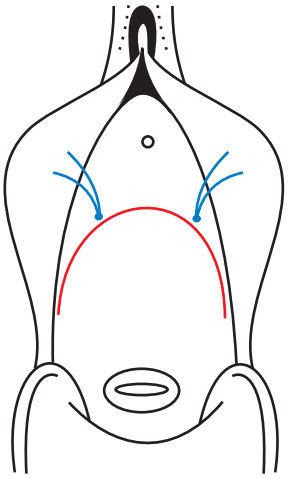
rhaphy sutures
1,5 to 4 cm



rhaphy sutures tied
urethralization



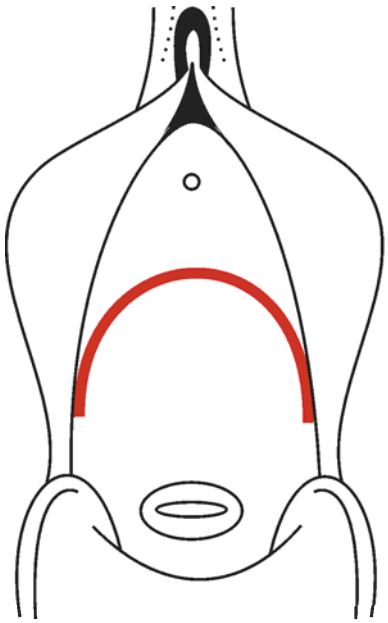
fixation sutures
at 1.5-2 and 3-4 cm



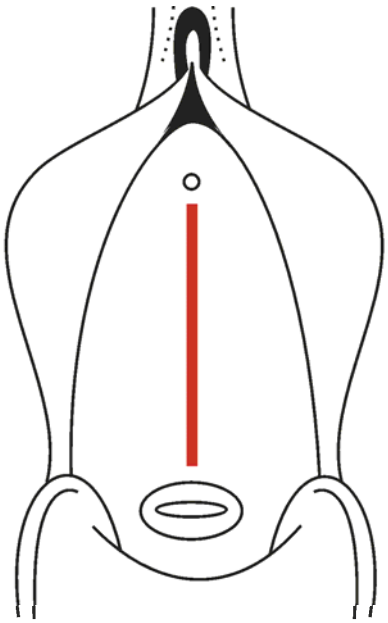
fixation sutures tied
anterior vagina wall adapted

note: the **most mutilating incision in surgery** is the median longitudinal incision thru the anterior vagina wall perpendicular to the ruga folds (violating any plastic and basic surgery principle) resulting in severe contraction/mutilation of the scar pulling the external urethra opening and posterior urethra wall towards the cervix disturbing the continence/closing mechanism and giving rise to dyspareunia; even if the fasciorrhaphy has been alright this will undo the whole repair: repairing with the right hand and wrecking it with the left hand simply because one has learned a trick and does not understand what one is doing; this is worth a full scientific article in a major gynecologic journal

any incision in the anterior/posterior/lateral vagina wall must be parallel to the ruga folds; then it will heal without a trace



physiologic incision
anterior vagina wall



mutilating incision
against any principle

pre-, intra- and postoperative management of RVF

the better the organization of the preoperative preparation, of the operation theater and of the postoperative care **the better the outcome of fistula surgery** and **the better the chance of social rehabilitation**
however, it cannot be stressed enough that the weakest point of fistula surgery in the developing world is the poor nursing care

preoperative preparation
oral hematinics and high-protein diet; **no antibiotics**

laboratory
Hb/Ht

X-rays are
not recommended

examination
normal vaginal examination at first visit and the day before surgery
EUA (examination under anesthesia) is nonsense if it is not followed up **immediately** by surgery **in the same session**

anesthesia
spinal anesthesia with a long-acting agent, e.g. hyperbaric bupivacaine 5%

manpower
only the surgeon and one intrumentating operation theater nurse
one retractor inside the vagina is already a crowd

special instruments
self-retaining weighted AUVARD speculum, long vaginal instruments, sharply curved THOREK scissors, sharp DESCHAMPS aneurysm needle

suturing materials
polyglycolic acid and nylon; expensive atraumatic suturing materials are not required

operation route
the vagina in type I through type IIb fistulas; exceptionally as in type Ic and III fistulas other routes may be necessary

position on the operation table
exaggerated lithotomy position with the legs flexed and slightly abducted in the leg-holders

accessibility

by median, uni- or bilateral episiotomies

examination under anesthesia

this is done by any surgeon for whatever surgery **at the beginning of any operation**; the fistula is classified and a final decision taken how to tackle this specific fistula

classification of fistulas according to anatomic/physiologic location

- **I** proximal fistulas
  - **a** without rectum stricture
  - **b** with rectum stricture
  - **c** with circumferential defect very seldom
- **II** distal fistulas
  - **a** without sphincter ani involvement
  - **b** with sphincter ani involvement
- **III** miscellaneous, e.g. ileouterine fistulas after instrumental abortion

further classification as to size

small	< 2 cm
medium	2-3 cm
large	4-5 cm
extensive	$\underline{\geq}$ 6 cm

operation air-tight closure of rectum whilst half-open adaptation or even no closure at all of posterior vagina wall (principles of septic surgery)

type Ia: transverse closure of rectum
type Ib: with disruption of rectum stricture
type Ic: (abdomino)vaginal approach with end-to-end anastomosis/colostomy

type IIa: longitudinal closure of rectum
type IIb: with sphincter ani/perineal body reconstruction

type III: depending upon the situation

vagina pack

no routine vagina pack; good check on hemostasis

perioperative antibiotics

tinidazole 2 g per os and one shot of broad-spectrum antibiotics i.m. at begining of anesthesia/operation

colostomy

this is **not curative** but a help; only if it can be guaranteed that 2 weeks after colostomy the RVF is repaired and that 4 weeks after successful repair the colostomy is closed

no solid food for 10 days

in order to have soft and less bulky stools

liquid paraffin

no straining on defecation

no antibiotics
only on strict indication, e.g. pneumonia

no sitzbaths
specifically when the sphincter ani has been repaired

prognosis as to closure
there is no relation to type of fistula and success at closure

social rehabilitation
by successful repair; it will take place spontaneously

future subsequent pregnancies/deliveries
regular antenatal care with delivery in hospital

sphincter ani rupture with longitudinal rectum trauma and perineum tear
minimal dissection, longitudinal distal ano-rectum closure with meticulous air-tight adaptation of internal sphincter by double layer of inverting poyglycolic acid, end-to-end external sphincter ani repair and perineal body repair leaving posterior vagina wall and perineum open

nb the rectum is very delicate and needs to be handled with care; as well there is always contamination so the principles of septic surgery have to be applied strictly and many times the posterior vagina wall is just left completely open; whilst the repair itself should be air-tight

do not waste time, energy and money on things which make no sense such as EUA, waiting 3 months after delivery before surgery etc.

concentrate on the most important thing: close the fistula

fig 61 type IIAa fistula; pc fascia defect

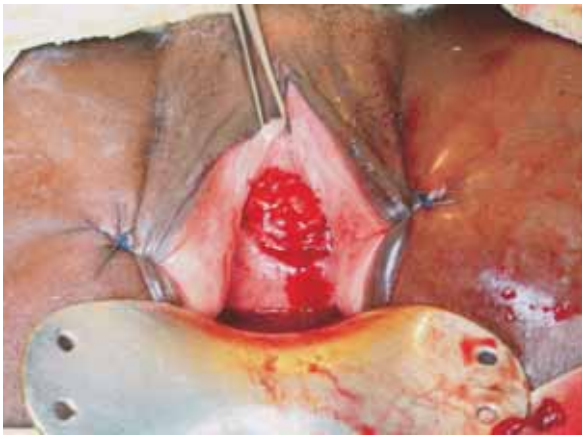


fig 62 incision + dissection

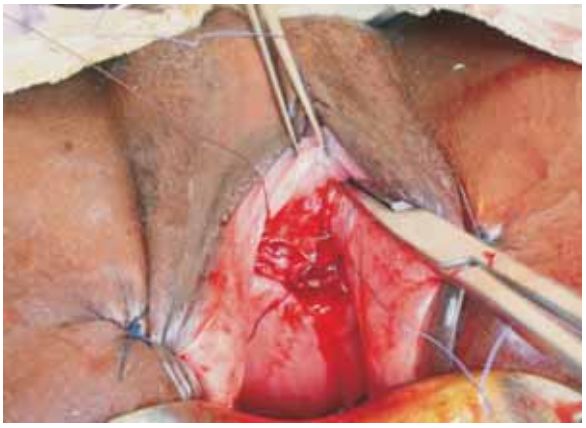


fig 63 fascia fixation to ATF

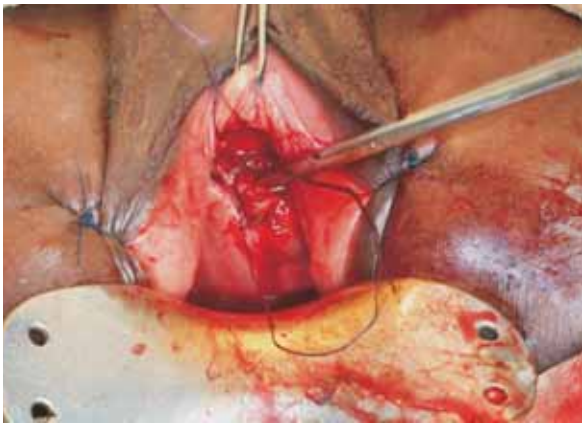


fig 64 pubocervical fascia

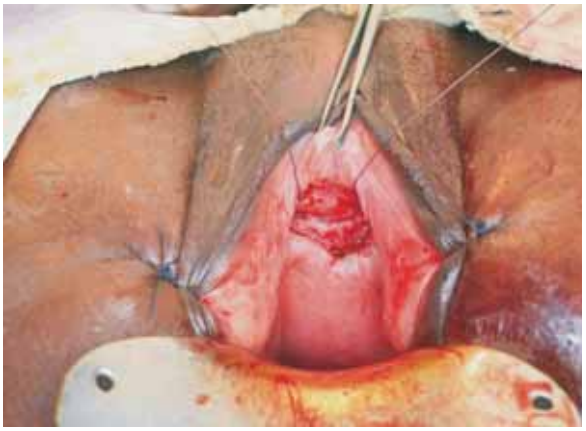


fig 65 fistula closed; fascia fixed

fig 66 anterior vagina wall adapted

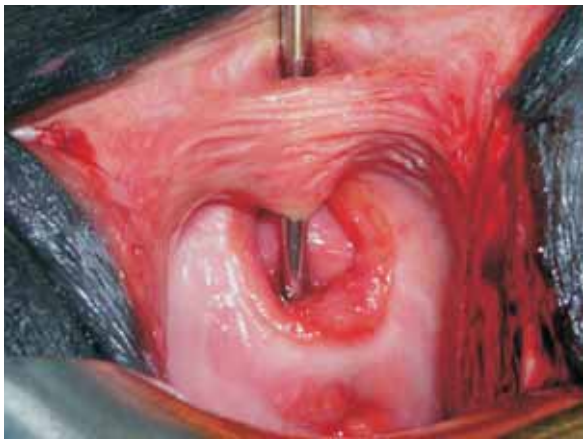


fig 67 type IIAb fistula; extensive

fig 68 incision; ureters catheterized

fig 69 circumferential repair

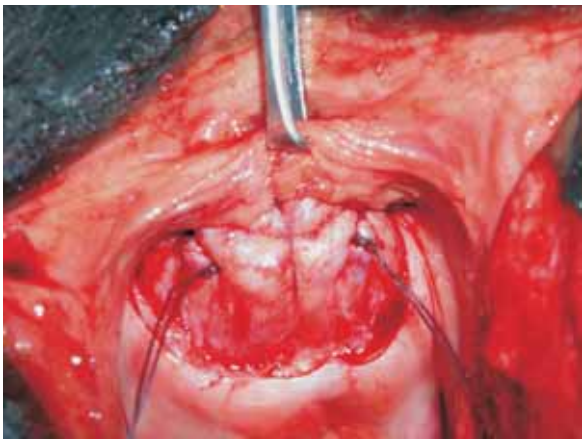


fig 70 closed

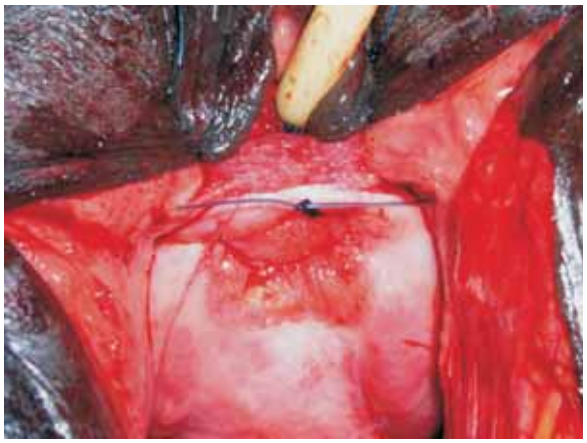


fig 71 anterior vagina wall adapted

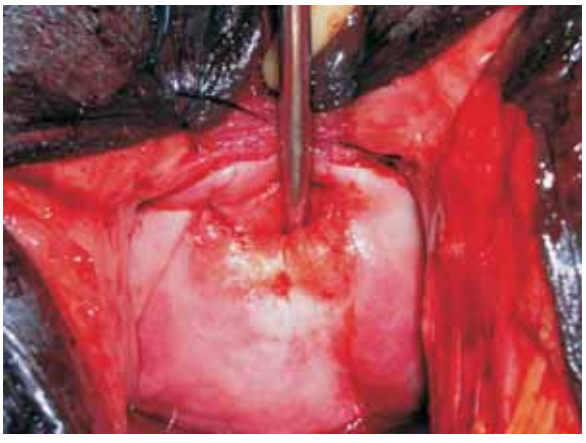


fig 72 uterine sound in cervix canal

classification of rectovaginal fistulas

In order to compare results and different operation techniques it is important to have a scientific classification which makes sense

the following classification is presented according to the anatomic/physiologic location with regards to operation technique (and prognosis?): type **I** proximal fistulas, type **II** distal fistulas and type **III** miscellaneous, see Table I

Table I

classification of fistulas according to anatomic/physiologic location

I	proximal fistulas	
	a without rectum stricture	
	b with rectum stricture	
	c with circumferential defect	very seldom
II	distal fistulas	
	a without sphincter ani involvement	
	b with sphincter ani involvement	
III	miscellaneous, e.g. ileouterine fistulas after instrumental abortion	

an additional classification is made to the size: small, medium, large and extensive, see Table II

Table II

classification of fistulas according to size

small	< 2 cm
medium	2-3 cm
large	4-5 cm
extensive	$\underline{\geq}$ 6 cm

the vaginal approach is the route of choice with or without episiotomies, spinal anesthesia is the anesthesia of choice and the (exaggerated) lithotomy position is the position of choice; type Ic and type III fistulas may need a different approach

in the complicated rectovaginal fistulas, it is advisable to have antibiotic prophylaxis by one shot of methronidazole or fasigyn in combination with a broad-spectrum antibiotic at the beginning of the operation

an incision is made at the fistula edge, a dissection of the posterior vagina wall performed and the rectum closed air-tight without tension by two layers of inverting polyglycolic acid sutures taking good small bites; the posterior vagina wall is half closed or even left open considering the fact that there is always contamination, allowing free spontaneous evacuation of small blood clots and bacteria in order to prevent abscess formation

only very complicated fistulas such as type Ic may need a temporary colostomy which automatically means at least 3 operations: colostomy, repair(s) and closure of colostomy

in type I fistulas the rectum closure is transverse, whilst in type II fistulas the closure is longitudinal; type Ic and type III fistulas may need an abdominal approach or a combined abdominovaginal approach

in type I fistulas one always has to check for rectum strictures and if found (in type Ib) these have to be disrupted bluntly

in type II fistulas one always has to check for sphincter ani involvement and if found (in type IIb) the sphincter ani and perineal body have to be reconstructed

though the operation technique is different for type Ia fistulas thru type III fistulas, there is no clear relation to success rate

in principle there is progressively more tissue loss in fistulas from small thru extensive; however, there are extensive fistulas which have become small due to scarring, and this should be taken into account; so there are extensive small fistulas; dissection becomes progressively more extensive, the operation progressively more complicated, and the results progressively worse from small thru extensive

with this classification it is possible to compare results and operation techniques in a scientific way

anesthesia in obstetric fistula repair

introduction

In developing countries there are many problems with the anesthesia due to lack of personnel, training, equipment, materials, drugs and money. Often the surgeon himself is responsible for the anesthesia.
Regional anesthesia does not require special equipment, is easy to learn, does not need intensive intra- and/or postoperative monitoring, is as effective as general anesthesia, does not require electricty, and is safe and cheap.
Therefore spinal anesthesia with a long-acting agent, such as bupivacaine, seems to be the method of choice.

methods

No premedication is given in order not to lower the blood pressure before the anesthesia.
The blood pressure is measured before starting with the patient lying on her back on the operation table which should be slightly elevated at the head end. The patient is instructed to sit on the operation table with the legs straight and then to bend forward holding both feet with her hands. The patient's lower back is disinfected with an antiseptic agent. A spinal needle 22G is introduced between the lumbar vertebra spinous processes L4/L5 through the yellow ligament, then turned 90° in order not to pierce but to divide the fibers of the dural sac and inserted into the dural sac. To check if the needle is really inside the dural sac, the needle is turned back 90° and the stylet removed. If clear cerebrospinal fluid is coming out of the needle 3 ml hyperbaric bupivacaine 0.5% from a previously prepared syringe is slowly injected into the dural sac fixing the needle all the time. The needle is left in for 10 more seconds (to prevent immediate leakage of the anesthetic agent out of the dural sac). Then the needle is removed and a methylated spirit-soaked gauze applied onto the injection mark.
The patient is positioned flat on the operation table with a cushion under her head to maximally flex the cervical spinal column and with the table slightly elevated at the head end.
The blood pressure is monitored after 5 and 10 min all the time speaking to the patient to make her feel comfortable.
If after 10 min she cannot lift her legs and the systolic blood pressure is at least 90 mm Hg the anesthesia is set and the operation is proceeded; if she can still lift her legs she should be checked for saddle block anesthesia, and if this found she should also be prepared for operation.
Only if the systolic blood pressure should drop below 90 mm Hg intravenous fluids are given.
If the patient develops severe bradycardia as seen in patients over 50 years old 0.6 mg atropine sulfate is given intravenously.
If after 10 min the patient still can lift her legs and the perineum is still sensitive for touch another intradural injection of 2 ml bupivacaine 0.5% is given at a lower level. If the second instillation is not successful the operation is postponed.
Intraoperative monitoring of the condition of the patient is being done by regularly taking her blood pressure and by speaking to her.
At the end of the operation her blood pressure is taken, and only if this is below 80 mm Hg with insufficient urine production intravenous fluids are given.

hydration
A high oral fluid intake until the anesthesia will keep the patient well hydrated during the whole procedure; in over 25,000 consecutive spinal anesthetic procedures shock was not encountered.
Intravenous preloading is not necessary, is expensive and complicates things such as more blood loss and interference with hemostasis.

vasopressors
In over 25,000 consecutive spinal anesthetic procedures vasopressors were not used simply because shock was not encountered.
The physiologic blood pressure lowering should be considered as an additional advantage: less blood loss and better hemostasis. In the 25,000 repairs sofar within the project, not a single blood transfusion was given.

complications
There are only three major complications, viz. total spinal block, shock and postspinal meningitis.
Total spinal block needs intubation and artificial ventilation until the drug effect has worn out; shock needs intravenous fluids fast; and postspinal meningitis needs antibiotics.
There are also three minor complications, viz. bradycardia, nausea and postspinal headache.
For severe bradycardia 0.6 mg atropine sulfate is given i.v.; nausea during operation disappears spontaneously after 5-10 min and needs no medication; whilst postspinal headache is treated by analgesics and disappears spontaneously after 3-5 days.
The smaller the needle used for spinal anesthesia the lesser the chance of headache if the right technique is being used.
If the anesthetic agent has been injected straight into the blood vessels (bloody tap!) due to wrong technique and the patient develops epileptic seizures due to excitation of the central nervous system diazepam = valium has to be given i.v.

conclusion
Because it is simple, effective, safe and cheap **spinal anesthesia** with a long-acting agent such as bupivacaine **is the anesthesia of choice** in developing countries for operations of the lower half of the body including obstetric fistula surgery.

fig 73 long-standing bladder prolapse

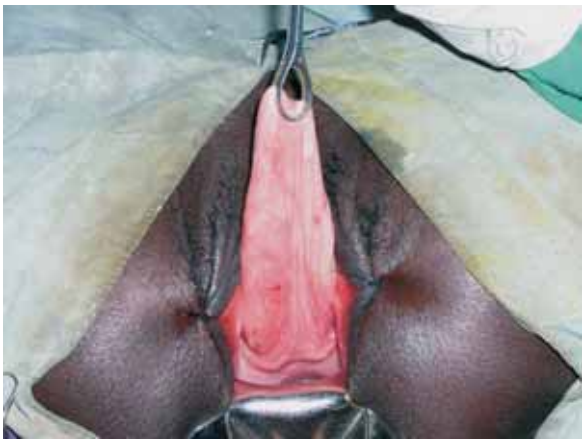


fig 74 whole bladder prolapse

fig 75 reduction; ureters catheterized

fig 76 incision

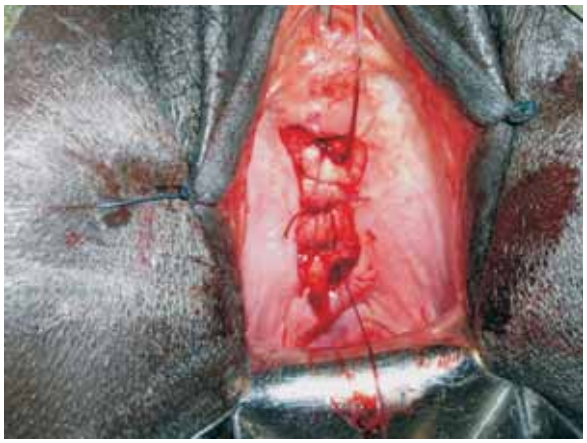


fig 77 longitudinal closure

fig 78 anterior vagina wall adapted

fig 79 type IIBa fistula

fig 80 incision

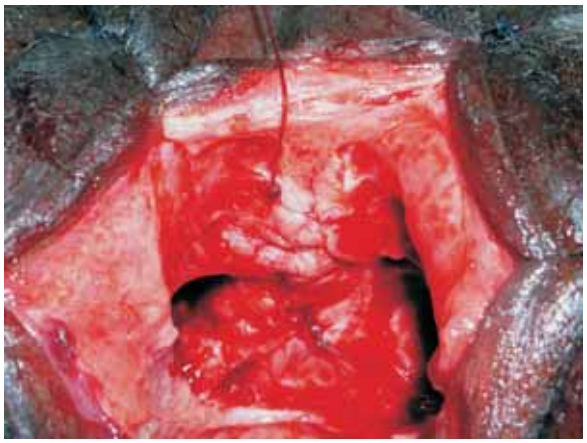


fig 81 longitudinal reconstruction

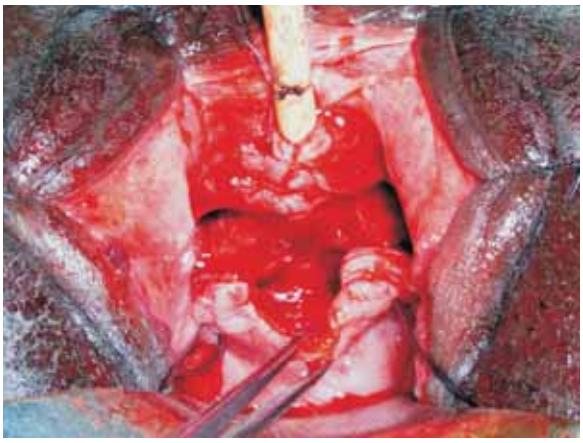


fig 82 foley ch18 catheter

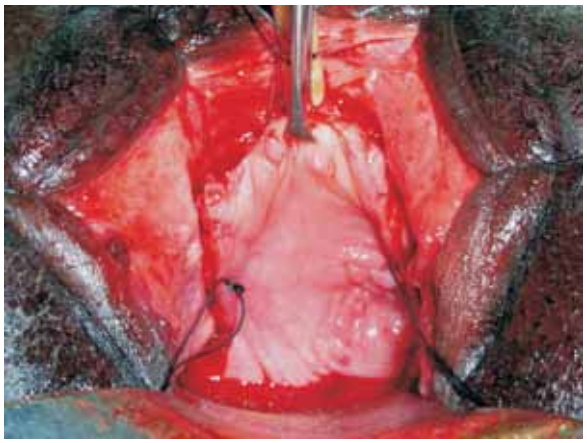


fig 83 advancement flap

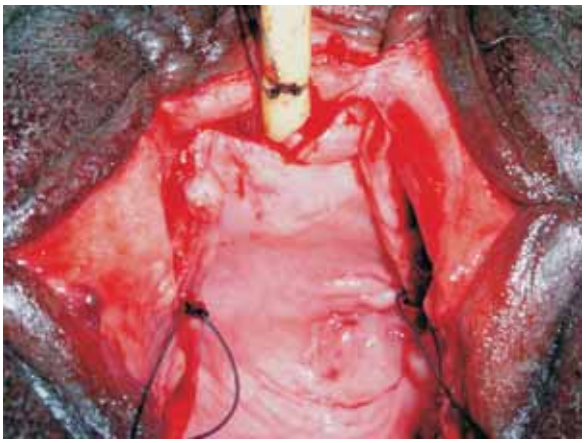


fig 84 four-point fixation

postoperative instructions and follow-up

postoperative ward

a. check blood pressure and pulse every 30 min for 4 hours

b. encourage **oral fluid intake, at least 6-8 liters per day**

c. check catheter drainage, and if blocked flush it or change it

d. **urine should be at least 4,000-6,000 ml per 24 hours and completely clear**

e. full mobilization the morning following surgery

f. no antibiotics unless specifically ordered

g. fersolate and folic acid 1 tablet ods each

h. remove pack after 1 day, carefully otherwise the patient will start bleeding

i. episiotomy sutures to be removed after 7-10 days

j. catheter to be removed after 2-4 weeks in the operation theater

after removal of the catheter the patient is discharged from the postoperative ward back to the hostel; she has to be instructed to continue drinking and to pass urine every 10-15 minutes

postoperative follow-up

intravaginal sutures to be removed 1 week after catheter removal

then 2 weeks later check-up

then 1 month later check-up

then 2 months later check-up

then 2-3 months later **last** check-up; patient can resume sexual activities

at each check-up please ask for the following and do not forget **health education**:

leaking yes/no

incontinence yes/no

normal miction yes/no

then examine and check for the following:

healed yes/no

elevation good/moderate/poor

(stress) incontinence yes/no

whatever you do write it down for documentation

history taking in obstetric fistula patients

how many deliveries:

how many are alive:

how long leaking urine: days/months/years

when did it start following labor: immediately or how many days later

how many days in labor:

where did you deliver: at home or in hospital

cesarean section: yes/no

sex of infant: boy or girl

condition of infant: stillborn, alive and died later, or alive

how long married: months/years

where did menstruation start: at parents' or at husband's home

living with husband on same compound: yes/no

still menstruating: yes/no

drop foot: yes/no

which side: right and/or left

for how long: months/years

leaking stools as well: yes/no

how many times operated:

grading of drop foot according to **M**edical **R**esearch **C**ouncil or MRC scale

0 no function whatsoever
1 only a muscle twitch
2 minimal movement (active dorsiflexion of toes)
3 active half-range movement if gravity is eliminated
4 active full-range movement with only slight muscle weakness
5 normal

fig 85 stress incontinence

fig 86 physiologic incision

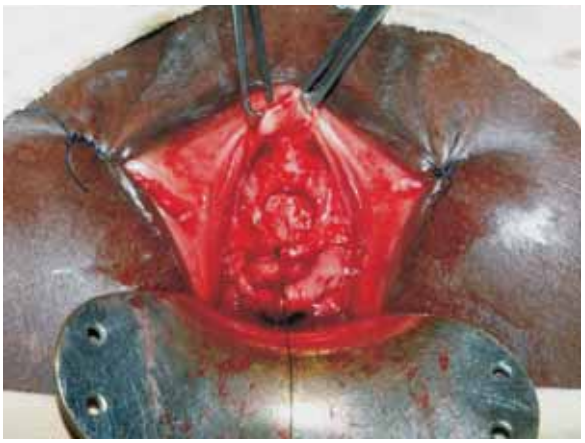


fig 87 first rhaphy suture of pc fascia

fig 88 rhaphy completed

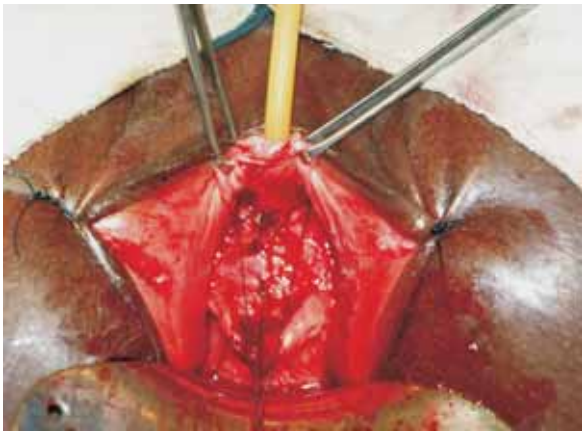


fig 89 fixation onto paraurethra ATF

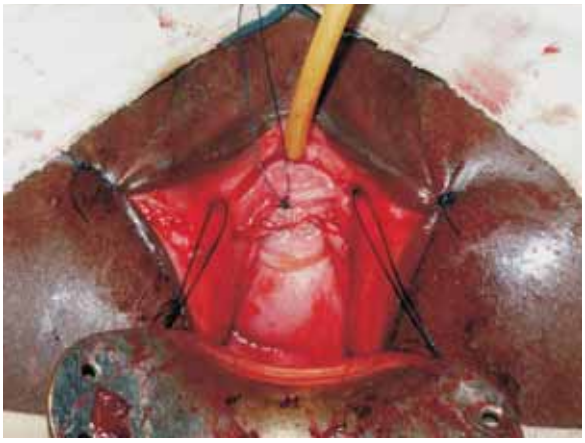


fig 90 catheter fixation

fig 91 safe motherhood

fig 92 bare sacrum

fig 93 extensive vulva necrosis

fig 94 debridement

fig 95 female epispadias

fig 96 striae in vagina

documentation

the importance of proper systematic documentation cannot be overstressed enough in order to evaluate the results, compare them with other centers and for research, and an effort should be made to write everything down

the documentation should contain the following information:

proper patient history

proper fistula history

sex and condition of infant

social status of patient

classification of fistula

size of fistula in cm

drop foot yes or no; and if yes MRC grade

other lesions due to obstructed labor

pubic arch and AP diameter of the maternal pelvis

anal reflex

detailed operation report

type of anesthesia

postoperative check-ups

healed or not

if healed continent or not

final result: **healed** with/without continence
continence rate of healed fistulas only and not of total number
not healed

then from time to time an evaluation of these things has to be made to draw some conclusions about incidence/prevalence in a certain area, to analyse the results and to audit the project

equipment and instruments

operating table

a well functioning hydraulic operating table, complete with shoulder supports and leg-holders and an inclination possibility of at least 60°, is a must

autoclave and sterilizer

either on electricity or on gas

operating lights

the best is a multiple-bulb system with the possibility of focussing

stand-by generator

this is a must since most of the time the main electricity sytem and/or the hospital generator are faulty

suturing materials

absorbable polyglycolic acid and nonabsorbable nylon sutures
loose suturing needles from ACUFIRM: Ga 314/7 and G 312/14

instruments	<u>at least 20 cm long</u>	**number**
trolley for placement of instruments		two
sponge forceps for disinfecting operation area		two
self-retaining weighted AUVARD speculum		one
pair of sharply curved THOREK scissors		one
pair of slightly curved long dissecting scissors		one
pair of curved scissors to cut sutures		two
sharp DESCHAMPS aneurysm needle		one
slender ALLIS clamps		four
mosquito artery forceps	10 cm long/curved	ten
long slender artery forceps	20 cm long/curved	four

slender needle holder	one
robust needle holder	one
slender scalpel holder for blades No. 11	one
slender toothed tissue forceps	one
calibrated up to 25 cm uterine sound	one
set of metal dilators from H3 thru H16	one
metal bladder flushing syringe of at least 50-100 ml	one
metal kidney bowls	two
OTIS urethrotome	one

fig 97 preoperative drinking

fig 98 position on operating table

fig 99 essential instruments

fig 100 postoperative ward

fig 101 bladder drill

fig 102 drying of cloths

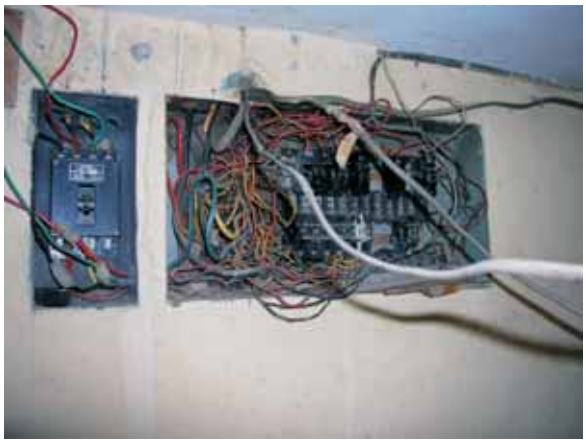


fig 103 electric fistula

fig 104 repair

fig 105 standby generator

fig 106 donation operation lights

fig 107 water supply

fig 108 on the road

setting up a VVF center

we have to realize that we are dealing with a **major public health problem** where we use surgery instead of drugs; if we are able to achieve a 85% success rate the programme is successful

new center

the best is to convert one ward in an existing hospital into a VVF postoperative ward and use an existing operation room for 1 day a week
however, right from the beginning a 20-bed hostel with rehabilitation facilities is needed, preferably outside the hospital premises

equipment

a well functioning hydraulic operating table, complete with shoulder supports and leg-holders and an inclination possibility of 60°, is a must and this cannot be compromised

hostel with rehabilitation facilities outside the hospital premises

this should be considered as **low care** where the patients can wait for their term of operation and where they can recover some time after operation; it needs at least 20-40 beds, bathroom, toilets etc
rehabilitation facilities where patients can be instructed during the waiting time and during their recovery; formal teaching rooms but also places for vocational rehabilitation such as sewing, soap making, making of baskets etc
do not convert this into a fistularium where the patients can live forever

strict separation of surgery and rehabilitation

make sure there is total separation of the functions to avoid conflict of interest since a professional surgeon is not a professional social worker
the surgical management should be under the Ministry of Health whilst rehabilitation should be managed by the Ministry of Social Welfare; however, there must be good cooperation

special (regional) fistula training/repair center

if the center is functioning and if there is need for more, a special VVF center should be built which can be used as a **training center**

do not establish fistularia

NB we should make an effort to provide a **short-term service** for the period of operation/rehabilitation but we should **not allow** our centers to become **fistularia** where we take full responsibility of these patients for the rest of their life and where the incurable patients **terrorize** the place and **prevent us from performing our normal VVF work**

obstetric fistula training

based on evidence

as practiced in

the national vvf project nigeria

25,000 vvf/rvf-repairs and related operations

establishment of 11 vvf-repair centers

execution of 15 workshops

training materials

training of

315 general doctors and consultants

236 pre- and postoperative nurses

71 operation theater nurses

15 anesthesia nurses

23 other persons

kees waaldijk MD PhD

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the obstetric fistula as a major public health problem

the need for training

the obstetric fistula is a major health problem on the rise for which a definite solution still has to be found; some 1,500,000 patients are desperately waiting for operation
prevention is a utopia for at least another century since a network of 150,000 functioning obstetric units are needed evenly distributed over the inhabited parts of Africa where day and night an emergency caesarean section can be performed upon arrival of the patient, with an even more concentrated network to detect the first sign of obstructed labor; that is the lesson learned from history in the industrialized world; what about delay in diagnosis of obstructed labor, in decision taking and in transport?
prevention of the woman from becoming an outcast is very well feasible, even under primitive conditions, by the immediate management by catheter and/or early closure
once the fistula patient has become an outcast, rehabilitation is only by successful closure of the fistula which means secondary/tertiary health care

the best we can aim for at the moment is to spread the expertise how to manage the obstetric fistula confidently within the scarce resources of developing Africa; and once available to keep this expertise where it is needed for as long as needed
for sustainability reasons, the management of the obstetric fistula has to be simple, safe, effective, feasible, affordable and payable
however, there are only 2 training centers in the world where systematically doctors, nurses and other health personnel are trained in the management of the obstetric fistula

since manpower, expertise, facilities, equipment, training materials and finances are scarce, it will take some time before an impact can be expected

some ideas on how to proceed are presented in separate chapters:

obstetric fistula training and trainees

training curriculum

training module

workshops

obstetric fistula training center

obstetric fistula repair centers

obstetric fistula rehabilitation

nation-wide obstetric fistula service

obstetric fistula tourism

training of industrialized world

besides this the obstetric fistula has to be integrated within the government health system as a major public health problem with a national program; also (inter)national donor agencies have to be involved

obstetric fistula training and trainees

introduction
in order to cope with the increasing number of obstetric fistula patients in the developing world it is important to train sufficient doctors, nurses and other personnel
the doctor trainees need at least 10 repairs under strict supervision, from placing the patient on the operating table until the very end of the operation
future trainers need personal exposure to the complicated and difficult fistulas in order to train other doctors in the noble art of fistula surgery; they have to become completely familiar with all kinds of fistulas and all kinds of operations
for nurses and other health personnel it is sufficient to have an intensive exposure to the obstetric fistula combined with practical and theoretical lessons

different training courses

a. training course for doctors without experience in fistula surgery
b. training course for consultants without experience in fistula surgery
c. training course for future doctor trainers with sufficient experience
d. follow-up advanced training courses in obstetric fistula surgery
e. training course for operation theater nurses
f. training course for pre- and postoperative nurses
g. training course for anesthesia nurses
h. training course for future nurse trainers with sufficient experience
i. refresher courses for nurses
j. training course for supporting staff and other (health) personnel
k. training course for doctors and staff from the industrialized world

requirements of doctors
a trainee must have a surgical experience of at least 3 years in order to learn the basics of obstetric fistula surgery; (s)he does not need to be a consultant but (s)he must be interested in the work and not in the money of the training course

requirements of future trainers
to become a future trainer, in principle the trainee should be a consultant and have already a personal experience of at least 200-300 repairs and he must be prepared to become a full-time fistula surgeon

requirements of nurses/midwives or anybody else
a trainee must be working with obstetric fistula patients and be willing to continue to do this; so any trainee should be screened well by his (her) employer and by the sponsoring agency

duration of training

for doctors without or with low experience in fistula surgery a period of 1.5-2 months will be sufficient if there are enough patients for them to operate upon; after 50-100 personal repairs, they can be trained again for 1 month

for nurses and other (health) personnel a period of 1 month will be sufficient if there are enough patients available

for future trainers the best would be an initial period of 1 month, then again 2-4 weeks after some 6 month and if necessary again 2-4 weeks after 6 months

training curriculum for doctors and nurses

the problem is that fistula surgery looks so simple, so everybody involved in gynecology is a fistula surgeon, and turns out to be so difficult
another problem is that surgery cannot be learned from a textbook or a theoretical lecture or a workshop but only by **performing the surgery oneself under supervision of an expert fistula surgeon** in a sufficient number of patients
however, before starting with the (surgical) management the trainee must learn and understand first the mechanism of obstructed labor, the complex trauma of the obstetric fistula, the complex anatomy of the pelvis and intrapelvic organs and their different tissues, muscles, ligaments etc and the theoretical solutions
once the doctor-trainee masters all the theoretical aspects, his practical training can start and **step-by-step** he has to be taught the (surgical) management of the obstetric fistula
though the nurse-trainee does not perform the surgery, (s)he must be familiar with all the surgical techniques and all the other theoretical and practical aspects

complex trauma of the obstetric fistula
the enormous variety of the obstetric fistula and other intravaginal, intrapelvic, extravaginal and systemic lesions due to obstructed labor

anatomy of the pelvis
the pelvic bones, the intrapelvic organs, the pelvic floor and their relation

history taking
parity, duration of leakage, previous repairs etc

examination of obstetric fistula patients
inspection, vaginal examination and examination of other lesions

classification of the obstetric fistula
based on the quantitative and qualitative amount of tissue loss of the continence/ closing mechanism with consequences for the operation technique and prognosis

immediate management of the obstetric fistula
by catheter and/or early closure

preoperative preparation
laboratory, high oral fluid intake, hygiene

spinal anesthesia
technique, monitoring and complications

surgical techniques
basic techniques for the different fistula types and their adjustment for that specific fistula + other techniques for stress incontinence, bladder stone, vagina atresia etc

handling of surgical instruments
this is difficult inside the vagina and needs expert coaching

intraoperative complications
ureters, hemorrhage, stool contamination etc

postoperative care
catheter management, high oral fluid intake etc

immediate postoperative complications
anuria, blocked catheter, secondary hemorrhage

continence mechanism in the female
theoretical aspects with practical (conservative and surgical) consequences

management of long-term sequelae
urethra stricture, bladder stone, vagina atresia, secondary amenorrhea

postrepair total urine intrinsic/stress incontinence
bladder drill, urethralization/fasciocolposuspension

how to set up a VVF-repair center
in an existing hospital

how to set up a VVF-training center
in an existing VVF-repair center

counseling
personal hygiene, when to start sexual intercourse, subsequent pregnancies and deliveries

depending upon their theoretical knowledge, their surgical skills and their surgical experience, it is clear that the training of each doctor is highly individual

since it takes 4-6 years to become a consultant surgeon, it is also clear that it takes a long time before one masters the **noble art of obstetric fistula surgery**

during their training course the doctor-trainees can only be taught the basic principles of obstetric fistula surgery, then with ups and downs they have to gather their own expertise by hard work

training is a continuous process which never stops

training module

evidence-based as practiced in the national vvf project nigeria

first
selection of an **obstetric fistula management team** consisting of a doctor, an operation theatre nurse, an anesthesia nurse and two pre- and postoperative nurses who are interested and willing to provide a service for the obstetric fistula patients

second
training of the complete team in an **established obstetric fistula training center** with a high turn-over of patients and a high number of repairs
for the doctor 6-8 weeks initially
for the nurses 4 weeks

third
organizing a 5-day workshop to operate a large number of patients in combination with lectures as co-facilitated by the consultant trainer + team for advocacy and publicity that something can be done and to start the obstetric fistula service in that area

fourth
the team starts working on its own with the simple fistulas which they must be able to handle themselves **confidently** after their initial training

fifth
the consultant trainer + team come from time to time for **on the job training** and to handle the more complicated fistulas and to select more staff for training

sixth
after 50-100 personal repairs, the doctor should come for advanced training to the obstetric fistula training center for 4-6 weeks in order to boost his expertise

seventh
the doctor continues his own surgical program and the consultant trainer + team come from time to time for further on the job training, to assess the service and to handle the difficult fistulas

eight
at any time the doctor comes for further training of 2-4 weeks whenever he thinks he needs more training

ninth
after 250-300 repairs and if feasible and if there is a need, the doctor should come to the training center for further **advanced training** to become a **future trainer**

tenth
at any time, be (s)he a doctor or already a trainer, whenever there is a need, (s)he should appeal and come for further training to the established training center

workshops have low value for the initial training but high value for (more) experienced fistula surgeons on specific topics such as postrepair incontinence and definitely value in advocacy and helping large numbers of patients within a short time.

workshops

there are several general and/or specific objectives: to operate a large number of patients within a short time, to demonstrate the state of the art operation techniques, to give high-quality lectures, to tackle a specific problem (stress incontinence, urinary diversion), to promote spinal anesthesia, to initiate doctors with low experience, to further train doctors with experience on an advanced level, to train nurses at all levels, to start a vvf service in a certain area and for advocacy and publicity

duration
from a minimum of 2-3 days to start a vvf service up to 2 weeks if large numbers of patients are available and reliable postoperative care can be secured

minimum number of patients
for a 1-week workshop 25-30 patients and for a 2-week workshop 40-50 patients, otherwise there is no cost-benefit effect

venue
any hospital which can handle the (large) number of patients to be operated within a short time: operation theater, autoclave, pre-/postoperative beds and trained personnel

equipment
if one/two fistula surgeon-trainer: one/two fistula operating table(s) with one/two full set(s) of instruments

pre-workshop screening
the (fistula) doctor of the hospital together with his staff is responsible to collect and screen the patients already far in advance
the logistic officer has to make all the necessary arrangements for accommodation, feeding and transport etc

facilitators
one or two experienced fistula surgeon-trainers, one or two experienced fistula operation theater nurses, one or two experienced spinal anesthesia nurses or doctors and two experienced pre-/postoperative nurses and one logistic officer

trainees
per trainer 3-4-5 doctors together with their operation theater nurse, their anesthetic nurse and their pre-/postoperative nurse
however, if the workshop is meant to start a vvf-service more doctors and especially more nurses and midwives should attend

workshop day-by-day
first day: opening, introduction, questionary by trainees for self evaluation and then history taking and examination of the patients, operation time-plan for each day

from second day onwards: wardround, operations with step-by-step demonstration of state of the art techniques, simple operations by the trainees under close supervision, pre-, intra- and postoperative questions and answers, lecture(s) and wardround
last day: ward round, evaluation by all participants, handing out certificates, closure

postworkshop follow-up
the fistula doctor of the hospital and his staff are responsible for the further postoperative care and follow-up of the patients

obstetric fistula training center

introduction
in order to cope with the increasing number of obstetric fistula patients in the developing world it is important to have **functioning training centers** where present and future generations of surgeons can be instructed in the (surgical) management of the obstetric fistula; the variety of qualitative and quantitative lesions of the obstetric fistula is such that they can only be taught the basics; since it is handwork the trainees need at least 10 repairs under strict supervision; following their training they still can operate confidently only the simple fistulas; however, only 15-20% of the fistulas are fit for the trainees, the rest is too complicated or too difficult
fr nurses and other health personnel it is sufficient to have an intensive exposure to the obstetric fistula combined with practical and theoretical lessons
fllowing a simple calculation model the following can be demonstrated

requirements of the trainer
for a trainer to perform well he needs sufficient experience considering the variety and the difficulty grade of obstetric fistula surgery, i.e. a minimum of 400-500 repairs; otherwise it would be the blind teaching the lame how to cross the road
in principle the trainer must be a consultant in order to have sufficient authority within the institution, within the set-up of the (government) health care and within the region from which the trainees are coming

requirements of supporting staff
since it is teamwork that counts, also his supporting staff should be of high quality in order to teach the trainees, be it a doctor or a nurse or anybody else, the preoperative care, the anesthesia, the postoperative care and the patient counseling

requirements of the training center
for a training center to function well there must be sufficient operations, at least 300 fistula repairs a year, i.e. 6 operations per week; with less than 300 repairs it will be difficult to sustain a continuous daily intensive training/teaching programme
with 300 repairs a year there are only 45-60 operations available for the trainees, or only 1 repair a week
this would mean that the center can only handle 5-6 trainees a year, and that only 1 trainee can be taught at the same time
during a training period of 2 months, a trainee will be present at only 55-60 repairs out of which he can perform 9-10 simple repairs himself
however, some will be lucky and some not since the patients are not coming evenly distributed over the whole year; the same applies to the patients with a simple fistula which can be handled by a trainee
in principle, the center should be a government-owned or a government-recognized training center where government, mission and even private doctors and nurses can attend the postgraduate courses

on the job training of residents or other doctors in teaching or other hospitals
this takes a long time and is only possible if the trainer has sufficient experience and the number of patients is enough as explained already
it would be better to assign the residents to a real obstetric fistula repair or training center for 2 months for an intensive exposure to the obstetric fistula

obstetric fistula repair center

this should be a separate unit with a separate hostel, a separate ward and a separate operating theater with separate staff for pre-, intra- and postoperative care

in the beginning it can be integrated within an existing hospital and then one fixed day a week has to be a full fistula operating day (no other operations, neither planned nor emergency); but if the number of operations are more than 150-200 a year a specific VVF center should be built

as it is a fistula repair center it should concentrate on the surgery only, otherwise the professional surgeon and his professional medical staff are wasting their time: a surgeon and his medical staff are not social workers

to prevent conflict of interest the hostal annex rehabilitation center should be situated outside the hospital premises, but in the neighborhood

once the surgical job has been finished other professional social staff have to take over the rehabilitation

an effort has to be made to keep things simple with straightforward pre-, intra- and post-operative guidelines

the one thing that cannot be compromised is a high-quality operating table; except for sharply curved THOREK scissors and sharp DESCHAMPS aneurysm needle no special instruments are needed

spinal anesthesia is safe, simple, effective and cheap since it does not need expensive equipment

for laboratory investigations Hb and serum creatinine would be advisable; urine investigation is unreliable

X-rays are not required; even if the X-IVP would show abnormalities this does not mean that the patient cannot be operated

physiotherapy is something for the rehabilation center but only if fixed contractures have developed; immediate mobilization is the best to prevent them

the treatment of obstetric fistulas should be free of charge but the patient should bear some of the costs

in order to bring the service towards the patients **it is better to have multiple small centers than one large center in a country** especially since the action radius of an obstetric fistula repair center is 100-120 km; in planning a nation-wide service this should be taken into account

obstetric fistula rehabilitation center

rehabilitation means: prepare/help the patient to take full control of his/her life ... and does not mean: make the patients dependent upon the service depriving them of their own responsibilities, that is the wrong approach and has nothing to do with rehabilitation

the **best rehabilitation** is a **successful repair**; then it will take place spontaneously

only the **"incurables"** (after multiple repairs which did not stop the continuous urine leaking, be it a residual fistula or total postrepair urine incontinence) need vocational training in order to earn their own living; though for these unfortunate girls/women life has ended, someway somehow they have to continue

this is not a job for the professional surgeon and his professional medical staff but for other **social** professionals; unfortunately, the social professionals are not or not yet interested

the best would be a hostel annex rehabilitation center in the neighbourhood of a fistula repair center where the social workers could do their job; this center has to be outside the hospital, otherwise there will be a negative impact upon the functioning of the fistula repair center

what happens if there is no separation of hospital and rehabilitation services is the following; since the women have to survive, males come at night and visit them in the center (for some males the smell of urine seems to be an aphrodisiac; as well the women are highly attractive!), some of them fight over one woman and males and females fight the staff if they are trying to prevent them from entering the compound and break the wall if the gate is closed; many times the police has to intervene; however, if the police is asked to prevent this from happening, they take the patients as girlfriends and it is even more difficult to reverse this; as well the old patients are instructing the new patients in all types of behavior which is not in line with the hospital instructions; they have their own ideas about the pre- and postoperative management and some of them even sell native medicine to the new patients with terrible consequences; they claim the best food and the best places in the hostel for which they befriend the male staff of the hospital or bribe the female staff; that is all fine in the struggle for survival and everybody is free in doing what (s)he has to do, but for smooth running of hospital services such as obstetric fistula surgery it is not ideal

the hostel annex rehabilitation center has to be in the neighbourhood of the fistula repair center for quick communication and smooth cooperation

to avoid conflict of interest the fistula repair center has to come under the Ministry of Health and the hostel annex rehabilitation center under the Ministry of Social Welfare; however, there must be good cooperation

however, do not convert these rehabilitation centers into **fistularia** since anybody must take the full responsibilities of his/her own life

nation-wide obstetric fistula service

any country with a high prevalence of the obstetric fistula should make an effort to organize and execute a nation-wide feasible and sustainable obstetric fistula service, especially since it will take another century to prevent it from occurring

in order to bring the service towards the patients (and not the other way round) and taking into account the action radius of an obstetric fistula center of 100-120 km the following is suggested to create a nation-wide network of functioning centers
one big referral center for the whole country (where patients have to travel long distances, the awareness that something can be done is low and the referral system is not functioning) is not the ideal set-up

national masterplan with national program
developed and coordinated by the national ministry of health; with its own budget

regional masterplan with regional program
developed and executed by the regional ministry of health; with its own budget

national obstetric fistula training center(s)
at least one training center and if needed more training centers depending upon the size of the country and the distribution of the health services
if the country has been divided into large geopolitical regions, each region needs its own training center
each center has to be an **independent** obstetric fistula hospital (not a subunit of the gynecologic department) to ensure that the patients and the trainees get **first priority** without interference by others
however, each center should be liaised with the (university) teaching hospital

regional obstetric fistula repair centers
each region, be it state, province or département needs its own obstetric fistula repair center, preferably in the capital of the region
this repair center should be an **independent** obstetric fistula hospital where only VVF and RVF repairs and related operations are performed; so no interference by others for gynaecologic operations or emergency operations such as caesarean section

incentives for the personnel
since there is no money to be made in the management of the obstetric fistula somehow the highly qualified and educated personnel have to be compensated, financially and in career planning; otherwise they will leave

step-by-step implementation
things cannot be changed overnight but an effort has to be made so that within 2-5 years each country has its own functioning service in place and then sustain it

training curriculum for residents in obstetrics and gynecology

actually each and every gynecologist should have ample knowledge of the obstetric fistula and be able to perform the simple repairs as that is his job; however, during their training they have not been exposed sufficiently and now it is too late

therefore it would be better for the present and future residents to have an **intensive exposure** to the obstetric fistula of 2 months in either a repair or a training center instead of exposure to urology and their official curriculum should be adjusted

obstetric fistula tourism

or as a hausa proverb says

the king in one country is a beggar in another

report american sugeons' visit to sokoto from 21/9- thru 29/9-97

for political reasons and because there was a lot of money to be shared locally amongst the organizers, the usual thing in africa, a team of american surgeons (gynecology/ surgery/plastic surgery/anesthesia) from a University Teaching Hospital came to maryama abacha hospital to perform obstetric fistula surgery

though in their own surroundings they are experts, their experience in obstetric fistula surgery was **zero** simply because there are no obstetric fistulas in america

the chief consultant fistula surgeon offered to help and was willing to train them but they were so **arrogant** that they refused to talk to him since they **knew it all**

so they teamed up with some nigerian doctors who did not have the slightest clue as well; in total they were nine: dr e, dr b, dr h, dr k, dr k, dr b, dr g, dr v and dr b

to **show off** they started with the most complicated patients who had been operated already once or even more times

they worked in two teams from 9.00 am up to midnight since operation time got out of hand: from a minimum of 2 hours up to 7 hours!

on the very first day one patient died immediately afterwards, and her name was not entered in the operation register whilst all the documents disappeared (american **litigation**)

after 3 days the resident doctors who came to **"admire"** their surgical skills walked out on them though in a polite hausa way

after 6 days the remaining patients refused to be operated since they are highly intelligent and noticed that none of the operated patients were ok but started to leak already after 1-2 days; as well some of the staff advised them so

so the last two days only 1 desperate patient a day came forward to be operated

they were only interested in the surgery and did not even bother about postoperative care and follow-up and left the mess for the chief consultant and his team to be sorted out

the **'result'** of their **arrogance** and **obstetric fistula analphabetism** is the following:

total number of patients operated:		32 patients
outcome:	**early breakdown/leaking:**	**30 patients**
	not leaking (ureterosigmoidostomy):	**1 patient**
	postoperative mortality:	**1 patient**

it is left to the reader to draw his/her own conclusions about the **value of obstetric fistula tourism**

list of obstetric fistula patients operated from 21/9- thru 29/9-97

patients name/town	op date	approach	outcome
h m mabera	21/9-97	abdominal	leaking
h m gandi	21+27/9-97	abdominal	leaking
z l sabon-birni	21/9-97	vaginal	leaking
? ? ?	21/9-97	abdominovaginal	died
a a yabdo	22/9-97	vaginal	leaking
a m kwana	22/9-97	abdominal	leaking
a m ginga	23/9-97	abdominal	leaking
f m shuni	23/9-97	abdominal	leaking
h m sokoto	23/9-97	abdominal	leaking
f g katami	23/9-97	abdominal	leaking
a l kura	23/9-97	abdominal	leaking
i g bodinga	23/9-97	abdominal	leaking
z u achida	23/9-97	abdominal	leaking
r m gwadabawa	24/9-97	abdominal	leaking/infected
a s moriki	24/9-97	vaginoplasty	leaking
s m wurno	24/9-97	vaginal	leaking
s a gwadabawa	24/9-97	abdominal	leaking
k m gada	24/9-97	abdominal	leaking
r m samamum	24/9-97	abdominal	leaking/infected
n m gwadabawa	24/9-97	abdominal	leaking
a y chimola	25/9-97	abdominal	leaking
i i hamali	26/9-97	abdominal	leaking
h b dankaiwa	26/9-97	vaginal	leaking
a u dange	26/9-97	vaginal	leaking
a m dange	27/9-97	abdominal	leaking
h l dange	27/9-97	abdominal	leaking
a i ilorin	27/9-97	**ureterosigmoidostomy**	**ok**
r i gwadabawa	27/9-97	vaginal	leaking
m h binji	27/9-97	abdominal	leaking
a a sokoto	28/9-97	vaginal	leaking
h b mabera	29/9-97	vaginal	leaking

after long deliberations the author decided to come out with this detailed report about **obstetric fistula tourism** since this has been repeated several times by others and it seems that some groups/organizations are planning to make the same mistake; some even think of involving the tourists in **training**

however, neither the patients nor the tourists are helped by such an exercise

it is laudable to help these poor patients but then **make sure one is trained properly** by expert fistula surgeons who are **highly willing to do so!**

training doctors and staff from the industrialized world

whilst educating the organizations

there are many doctors, nurses and other persons in the industrialized world who are very much willing to help the obstetric fistula patients in the developing world; for this they are volunteering to spend their own money (expensive air travelling, accommodation, feeding, no income), their time and their expertise; however, **no** experience with the obstetric fistula

there are organizations in the industrialized world willing to sponsor initiatives that will contribute to the management of the obstetric fistula patients by sending teams to operate them thinking that an expert surgeon in europe, asia, australia or united states is also an expert fistula surgeon in africa; however, they are **wrong**

it would be ridiculous not to make use of good-willing individuals and good-willing organizations; so we have to **educate** the organizations and we have to **train** the volunteer surgeons and staff **in the (surgical) management of the obstetric fistula** under rather primitive conditions in an **african** hospital

criteria for doctors and staff
they must have been working in a developing country for some years and willing to spend regular time (once or twice a year some weeks) in the future in a developing country; otherwise it is a waste of valuable time by the expert fistula surgeon

in nigeria the following procedure is used

first
initial visit of 2-4 weeks
teaching the complex trauma of the obstetric fistula, inspection and examination of the obstetric fistula patients and their lesions, spinal anesthesia and some personal **vaginal** repairs depending upon how long they stay
since most of them are already expert surgeons they do not need the intensive coaching of instrument handling
at the end they all say they never knew and never realized how complicated the surgical management of and how extensive the obstetric fistula trauma is

second
after their visit they know which fistulas they can handle themselves and which not, and now they can start with their surgery in order to gather their own expertise

third
follow-up visit of 2 weeks
after some 50 repairs they come back to discuss their experience and to upgrade their skills, if they feel they need it

fourth
they continue their work also operating the more complicated fistulas, and at any time they can come back if there is a need for **advanced-level fistula surgery**

fifth
follow-up visit of 2 weeks
actually one highly experienced urologist wants to come back for the third time

clinical and epidemiologic baseline data of

2,500 VVF/RVF-patients

with special emphasis on the obstetric fistula

by

kees waaldijk MD PhD

babbar ruga fistula teaching hospital
katsina
n i g e r i a

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foreword

scanning through the world literature no large series could be found with 'complete' baseline data about the vesicovaginal fistula, and especially the obstetric fistula

it seems that statements made long time ago were taken over indiscriminately by the authors following

the intention of this booklet is to provide baseline data of a large series of patients treated consecutively by the author in Northern Nigeria, viz. KATSINA and KANO

also to show that in cohort analysis of 100 consecutive VVF-patients each there is an enormous variety from one cohort to the other

all the data have been obtained by the author himself, with the help of his staff

all the patients were interviewed by the author in hausa, the lingua franca of the region

the Hausa/Fulani population of Northern Nigeria have a good sense of time and count; when there was a real discrepancy between what the patient said and what the team thought other ways were devised to come to the truth.

the first 700 VVF-repair patients, the first 100 VVF-catheter patients and the first 50 RVF-repair patients in KATSINA only have been partly reviewed retrospectively; having obtained enough experience the following patients in KATSINA and KANO have been reviewed prospectively; so there might be some discrepancy between the two groups based on methodology.

however, despite the setting and the setbacks, the obtained information is as accurate as possible

the data have been analysed separately for KATSINA and KANO and for the following groups: VVF-repair, catheter treatment (with/without suturing) and RVF-repair; between 40 and 60% of the patients treated first by catheter later on had a VVF-repair and most of the RVF-patients had a VVF as well

the service in KATSINA was started in 1983 and in KANO recently in 1990; in KANO all the data are prospective

age at which fistula developed

the age at which the fistula developed was calculated from the age of the patient minus the duration of leakage, also in year categories

for the first 700 VVF-patients, the first 100 VVF-catheter patients and the first 50 RVF-patients in KATSINA the age was determined by questioning the patient how old she was and how long she had been married and by our own estimation, taking it for granted that the majority married at 12-13 years
in order to improve the accuracy of our data, later on she was also asked when and where she had her menarche: before marriage in her parents home, after marriage in her husband's home and how long before or after marriage in months resp. years, stating menarche at 12 years of age; any woman, educated or not, must know where and when she had her first menstruation
in doing this it was found out that more than 95% of the girls in the rural areas married premenarchally, the great majority at 11-12 years
when there were real discrepancies, more things were asked such as how long she had been married before she delivered and so on; sometimes it took a long painstaking time

so for the first 850 patients in KATSINA the age was estimated at roughly one year older than for later patients in KATSINA and KANO

however, it might well be possible, that menarche is not at 12 but at 13 years

therefore three calculations were made, sothat anyone can make his/her own conclusions:

a the age as written down in our records taking into account the difference of roughly one year
b the age for a mean menarche at 12 years with correction of the first 850 patients
c the age for a mean menarche at 13 years with correction of the age of later patients

the great majority was teenager when it happened, viz. roughly 70%; even roughly 40% were younger than 16 years old

this means these are girls with their whole adult life still in front of them

however, the age at labor does not play a major role in the development of the fistula, though the author is not in favor of adolescent/child marriage; first, once a woman enters reproductive life she is fit to deliver as well biologically speaking; second, is the pelvis really becoming wider after 1 yr following the first normal menstruation (not functional bleeding)??; third, if there really were a connection, far more women in Northern Nigeria would have a fistula, as more than 90% do marry premenarchally and become pregnant as teenager
in my opinion, if the girls would marry 5 years later and then become pregnant they would develop their fistula 5 yr later

the real cause is the nonavailability of an obstetric service where a cesarean section can be performed within 3 hours from the time labor has become obstructed. With a cesarean section in time, no fistula

age at which fistula developed in year categories

patients	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
1-100		38	31	19	12			
101-200		31	48	14	7			
201-300		37	42	17	4			
301-400		36	35	23	6			
401-500	1	21	45	25	7		1	
501-600	1	27	33	30	9			
601-700		39	25	24	12			
701-800		43	25	20	11	1		
801-900	1	41	28	24	6			
901-1000	2	43	20	28	6	1		
1001-1100	2	45	25	17	10	1		
1101-1200	3	34	25	28	8	2		
1201-1300	1	43	27	19	8	2		
1301-1400		50	13	29	8			
1401-1500		48	21	20	11			
1501-1600	1	42	17	23	16	1		
1601-1700	1	57	12	16	16	3		
kano-vvf								
1-100	4	43	19	25	7	2		
101-200		43	23	20	14			
201-300	4	48	12	20	15		1	
301-400		55	14	21	10			
katsina-catheter								
1-100	2	36	30	26	6			
101-200		49	22	21	8			
kano-catheter								
1-100		59	14	22	5			
katsina-rvf								
1-100	3	46	27	20	3	1		

age at which fistula developed in year categories
total figures per center

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
1702	13	676	472	376	153	11	1	
in %	**0.8%**	**39.7%**	**27.7%**	**22.1%**	**9.0%**	**0.6%**	**0.1%**	
kano-vvf								
424	8	207	71	88	47	2	1	
in %	**1.9%**	**48.8%**	**16.7%**	**20.8%**	**11.1%**	**0.5%**	**0.2%**	
katsina-catheter								
292	2	131	61	72	25	1		
in %	**0.7%**	**44.9%**	**20.9%**	**25.7%**	**7.5%**	**0.3%**		
kano-catheter								
133		73	20	30	10			
in %		**54.9%**	**15.0%**	**22.6%**	**7.5%**			
katsina-rvf								
137	3	67	35	26	5	1		
in %	**2.2%**	**48.9%**	**25.5%**	**19.0%**	**3.6%**	**0.7%**		
kano-rvf								
45	1	31	6	5	2			
in %	**2.2%**	**68.9%**	**13.3%**	**11.1%**	**4.4%**			

age at which fistula developed in year categories
total figures per VVF-repair, VVF-catheter and RVF-repair

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
vvf-repair								
2126	21	883	543	464	200	13	2	
in %	**1.0%**	**41.5%**	**25.5%**	**21.8%**	**9.4%**	**0.6%**	**0.1%**	
vvf-catheter								
425	2	204	81	105	32	1		
in %	**0.5%**	**48.0%**	**19.1%**	**24.7%**	**7.5%**	**0.2%**		
rvf-repair								
182	4	98	41	31	7	1		
in %	**2.2%**	**53.8%**	**22.5%**	**17.0%**	**3.8%**	**0.5%**		

age at which fistula developed in year categories corrected for menarche at 12 yr

patients	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
101-200		47	33	14	6			
201-300		46	36	15	3			
301-400		43	33	19	5			
401-500	1	38	29	24	7		1	
501-600	1	36	25	29	9			
601-700		54	12	24	10			
701-800		43	25	20	11	1		
801-900	1	41	28	24	6			
901-1000	2	43	20	28	6	1		
1001-1100	2	45	25	17	10	1		
1101-1200	3	34	25	28	8	2		
1201-1300	1	43	27	19	8	2		
1301-1400		50	13	29	8			
1401-1500		48	21	20	11			
1501-1600	1	42	17	23	16	1		
1601-1700	1	57	12	16	16	3		
kano-vvf								
1-100	4	43	19	25	7	2		
101-200		43	23	20	14			
201-300	4	48	12	20	15		1	
301-400		55	14	21	10			
katsina-catheter								
1-100	2	43	24	26	5			
101-200		49	22	21	8			
kano-catheter								
1-100		59	14	22	5			
katsina-rvf								
1-100	3	52	23	18	3	1		

age at which fistula developed in year categories
corrected for menarche at 12 yr
total figures per center

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
1702	13	754	408	367	148	11	1	
in %	**0.8%**	**44.3%**	**24.0%**	**21.6%**	**8.7%**	**0.6%**	**0.1%**	
kano-vvf								
424	8	207	71	88	47	2	1	
in %	**1.9%**	**48.8%**	**16.7%**	**20.8%**	**11.1%**	**0.5%**	**0.2%**	
katsina-catheter								
292	2	138	55	72	24	1		
in %	**0.7%**	**47.3%**	**18.8%**	**24.7%**	**8.2%**	**0.3%**		
kano-catheter								
133		73	20	30	10			
in %		**54.9%**	**15.0%**	**22.6%**	**7.5%**			
katsina-rvf								
137	3	73	31	24	5	1		
in %	**2.2%**	**53.3%**	**22.6%**	**17.5%**	**3.6%**	**0.7%**		
kano-rvf								
45	1	31	6	5	2			
in %	**2.2%**	**68.9%**	**13.3%**	**11.1%**	**4.4%**			

age at which fistula developed in year categories
corrected for menarche at 12 yr
total figures per VVF-repair, VVF-catheter and RVF-repair

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
vvf-repair								
2126	21	961	479	455	195	13	2	
in %	**1.0%**	**45.2%**	**22.5%**	**21.4%**	**9.2%**	**0.6%**	**0.1%**	
vvf-catheter								
425	2	204	81	105	32	1		
in %	**0.5%**	**48.0%**	**19.1%**	**24.7%**	**7.5%**	**0.2%**		
rvf-repair								
182	4	104	37	29	7	1		
in %	**2.2%**	**57.1%**	**20.3%**	**15.9%**	**3.8%**	**0.5%**		

age at which fistula developed in year categories corrected for menarche at 13 yr

patients	1-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
1-100		38	31	19	12			
101-200		31	48	14	7			
201-300		37	42	17	4			
301-400		36	35	23	6			
401-500	1	21	45	25	7		1	
501-600	1	27	33	30	9			
601-700		39	25	24	12			
701-800		31	35	21	12	1		
801-900	1	32	33	27	7			
901-1000	2	34	26	30	7	1		
1001-1100	2	37	28	20	9	4		
1101-1200	3	23	35	26	11	2		
1201-1300	1	32	35	21	8	3		
1301-1400		41	21	25	13			
1401-1500		40	23	25	11	1		
1501-1600	1	33	26	18	20	2		
1601-1700	1	45	22	14	14	4		
kano-vvf								
1-100	4	35	26	24	9	2		
101-200		35	28	21	16			
201-300	4	42	18	16	18	1	1	
301-400		41	25	22	12			
katsina-catheter								
1-100	2	27	37	27	7			
101-200		43	27	15	15			
kano-catheter								
1-100		46	24	20	9	1		
katsina-rvf								
1-100	3	40	33	19	4	1		

age at which fistula developed in year categories
corrected for menarche at 13 yr
total figures per center

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
katsina-vvf								
1702	13	578	543	379	170	18	1	
in %	**0.8%**	**34.0%**	**31.9%**	**22.3%**	**10.0%**	**1.1%**	**0.1%**	
kano-vvf								
424	8	168	103	85	56	3	1	
in %	**1.9%**	**39.6%**	**24.3%**	**20.0%**	**13.2%**	**0.7%**	**0.2%**	
katsina-catheter								
292	2	108	78	66	36	2		
in %	**0.7%**	**37.0%**	**26.7%**	**22.6%**	**12.3%**	**0.7%**		
kano-catheter								
133		58	32	27	14	2		
in %		**43.6%**	**24.1%**	**20.3%**	**10.5%**	**1.5%**		
katsina-rvf								
137	3	55	47	25	6	1		
in %	**2.2%**	**40.1%**	**34.3%**	**18.2%**	**4.4%**	**0.7%**		
kano-rvf								
45	1	26	10	6	2			
in %	**2.2%**	**57.8%**	**22.2%**	**13.3%**	**4.4%**			

age at which fistula developed in year categories
corrected for menarche at 13 yr
total figures per VVF-repair, VVF-catheter and RVF-repair

total	0-10	11-15	16-20	21-30	31-40	41-50	51-60	yr
vvf-repair								
2126	21	746	646	464	226	21	2	
in %	**1.0%**	**35.1%**	**30.4%**	**21.8%**	**10.6%**	**1.0%**	**0.1%**	
vvf-catheter								
425	2	166	110	93	50	4		
in %	**0.5%**	**39.1%**	**25.9%**	**21.9%**	**11.8%**	**0.9%**		
rvf-repair								
182	4	81	57	31	8	1		
in %	**2.2%**	**44.5%**	**31.3%**	**17.0%**	**4.4%**	**0.5%**		

duration of leakage at operation

general

the duration of leakage at time of operation tells something about the (non)availability of a VVF-service, the quality/quantity of an existing VVF-service, the awareness of the general public (and patient) that something can be done, and the duration of a VVF-service; of course, it also gives an indication of how long these girls/women have been suffering

there is a patient's delay in coming and a treatment's delay due to the nonavailability of expertise and facilities

once a successful repair has been performed in a specific hospital, many more patients are coming

the better the expertise and the more facilities, the more patients come

the number of postoperative beds is a limiting factor for the number of operations which can be performed

a hostel where patients can stay preoperatively is important for a smooth organization of the VVF-service; also they can stay there when they come for postoperative check-up

the normal intensive action radius of a functioning VVF-center seems to be 100 to 120 km; then it is declining rapidly

once a center gets a certain "fame" also patients are coming from far away (exceptionally more than 1,000 km) for treatment

specific

since a hostel was opened where the patients could stay preoperatively, most patients stayed there until their turn; before that time they were given a date to return, but many did not stick to their appointment and sometimes came back years later claiming they had difficulties at home

since a start was made in 1992 to immediately close the fistula as soon as the slough had gone, especially in the big town KANO more patients were referred almost immediately after labor and this seemed to be another incentive for the patients to come forward early for treatment

as catheter treatment was indicated in patients leaking up to 3 months the duration of leakage was very short in these groups

as normally the RVF was operated after the VVF had healed, the duration tended to be longer in these groups

interpretation

the figures do not give straightforward information, but should be interpreted taking into account all the factors involved

duration of leakage in years

patients	<1	1	2	3	4	5	6-10	11-20	21-30	>30	yr
katsina-vvf											
1-100	26	17	17	14	9	9	4	4	5	6	
101-200	29	18	17	8	7	4	15	2			
201-300	20	23	10	14	10	6	13	4			
301-400	21	10	14	15	11	3	24	2			
401-500	39	10	17	9	3	4	16	2			
501-600	37	16	9	6	6	7	13	3	2	1	
601-700	46	11	7	6	5	3	17	4	1		
701-800	30	11	8	15	11	10	9	3	2	1	
801-900	36	16	4	6	7	8	18	5			
901-1000	50	7	11	7	5	8	9	2	1		
1001-1100	54	8	7	4	4	3	13	7			
1101-1200	28	15	6	8	5	4	28	5	1		
1201-1300	45	16	6	8	1	2	15	6	1		
1301-1400	57	14	7	1	4	1	10	6			
1401-1500	46	15	12	5	4		9	6	3		
1501-1600	42	10	12	7	6	5	9	8	1		
1601-1700	54	8	8	2	3	4	12	6	3		
kano-vvf											
1-100	18	14	22	7	4	5	25	5			
101-200	52	7	9	3	2	4	19	3	1		
201-300	57	11	4		5	4	15	4			
301-400	50	15	10	4	4	1	11	5			
katsina-catheter											
1-100	90	4	1	2	1		1	1			
101-200	96	1	1	1			1				
kano-catheter											
1-100	97		2			1					
katsina-rvf											
1-100	27	11	20	8	10		15	3			

duration of leakage in years
total figures per center

total	<1	1	2	3	4	5	6-10	11-20	21-30	>30	yr
katsina-vvf											
1702	661	225	173	135	101	81	234	75	14	3	
in %	**38.8**	**13.2**	**10.2**	**7.9**	**5.9**	**4.8**	**13.7**	**4.4**	**0.8**	**0.2**	
kano-vvf											
424	195	49	45	14	16	14	73	17	1		
in %	**46.0**	**11.6**	**10.6**	**3.3**	**3.8**	**3.3**	**17.2**	**4.0**	**0.2**		
katsina-catheter											
292	274	7	3	3	1	1	2	1			
in %	**93.8**	**2.4**	**1.0**	**1.0**	**0.3**	**0.3**	**0.7**	**0.3**			
kano-catheter											
133	128		2				2		1		
in %	**96.2**		**1.5**				**1.5**		**0.8**		
katsina-rvf											
137	39	13	29	9	11	7	23	5	1		
in %	**28.4**	**9.5**	**21.2**	**6.6**	**8.0**	**5.1**	**16.8**	**3.6**	**0.7**		
kano-rvf											
45	11	7	9	3	3	2	9	1			
in %	**24.4**	**15.6**	**20.0**	**6.7**	**6.7**	**4.4**	**20.0**	**2.2**			

duration of leakage in years
total figures for VVF-repair, VVF-catheter and RVF-repair

total	<1	1	2	3	4	5	6-10	11-20	21-30	>30	yr
vvf-repair											
2126	856	274	218	149	117	95	307	92	15	3	
in %	**40.3**	**12.9**	**10.3**	**7.0**	**5.5**	**4.5**	**14.4**	**4.3**	**0.7**	**0.1**	
vvf-catheter											
425	402	7	5	3	1	1	4	1	1		
in %	**94.6**	**1.6**	**1.2**	**0.7**	**0.2**	**0.2**	**0.9**	**0.2**	**0.2**		
rvf-repair											
182	50	20	38	12	14	9	32	6	1		
in %	**27.4**	**11.0**	**20.9**	**6.6**	**7.7**	**4.9**	**17.6**	**3.3**	**0.5**		

cause of fistula

since the establishment of a functioning obstetric network in the industrialized world, there has been a shift there from obstetric fistulas to other types of fistula; if encountered it constitutes a rarity nowadays

in the developing world, especially in Africa, where there is no network of functioning obstetric units, obstructed labor remains the main cause of VVF and RVF

the obstetric fistula still accounts for over 85-90% of all the 2 million fistulas world-wide

it has nothing to do with age, parity, religion, education, tribe, social status or whatsoever, but only with the fact if the obstructed labor can be relieved in time by a cesarean section, i.e. is an obstetric unit available and is it used in time

there is not only obstruction of labor but also obstruction at any level of labor management such as obstruction at antenatal care, obstruction at diagnosis, obstruction at decision taking what to do with the woman, obstruction in getting money to pay for transport and medical care, obstruction at transport, and obstruction at secondary and eventually at tertiary health care level to organize for a cesarean section

theoretically the solution is very simple, to provide an easy access to a proper obstetric unit for any woman who needs it; if this is achieved then to change sociocultural patterns sothat any woman who needs it also goes to this unit

this has happened in the industrialized world; but how can this be achieved in the developing world?

for the inhabited parts of Africa (some three fifths of 30,244 million sq km) a total network of 75,000 obstetric clinics are needed each serving an area of 320 sq km; each clinic has to be fully equipped (operation table, instruments, autoclave, blood bank etc) and needs higly specialized personnel (surgeon, anesthetist, theater nurses and anesthetic nurses etc)

any fistula which developed as a result of labor was classified as obstetric including those due to harmful traditional practices during labor and those due to cesarean section (harmful medical practices?).

cause of fistula

patients	obstetric	nonobstetric
katsina-vvf		
1-100	97	3
101-200	91	9
201-300	97	3
301-400	94	6
401-500	91	9
501-600	97	3
601-700	96	4
701-800	94	6
801-900	95	5
901-1000	95	5
1001-1100	95	5
1101-1200	88	12
1201-1300	97	3
1301-1400	96	4
1401-1500	96	4
1501-1600	94	6
1601-1700	95	5
kano-vvf		
1-100	88	12
101-200	95	5
201-300	90	10
301-400	96	4
katsina-catheter		
1-100	96	4
101-200	97	3
kano-catheter		
1-100	95	5
katsina-rvf		
1-100	95	5

cause of fistula
total figures per center

total patients	obstetric	nonobstetric
katsina-vvf		
1702	1610	92
in %	**94.6%**	**5.4%**
kano-vvf		
424	391	33
in %	**92.2%**	**7.8%**
katsina-catheter		
292	283	9
in %	**96.9%**	**3.1%**
kano-catheter		
133	127	6
in %	**95.5%**	**4.5%**
katsina-rvf		
137	128	9
in %	**93.4%**	**6.6%**
kano-rvf		
1-45	42	3
in %	**93.3%**	**6.7%**

cause of fistula
total figures per VVF-repair, VVF-catheter and RVF-repair

total patients	obstetric	nonobstetric
vvf-repair		
2126	2001	125
in %	**94.1%**	**5.9%**
vvf-catheter		
425	410	15
in %	**96.5%**	**3.5%**
rvf-repair		
182	170	12
in %	**93.4%**	**6.6%**

fistula classification

VVF

the following classification of VVF, as developed during a **PhD study at the University of Utrecht in 1989**, is presented according to its anatomic/physiologic location with regards to operation technic and prognosis:

- **I** fistulas not involving the closing mechanism
- **II** fistulas involving the closing mechanism
  - **A** without (sub)total urethra loss
    - **a** without a circumferential defect
    - **b** with a circumferential defect
  - **B** with (sub)total urethra loss
    - **a** without a circumferential defect
    - **b** with a circumferential defect
- **III** ureterovaginal and other exceptional fistulas

one of the major problems of VVF-surgery is the development of postoperative urinary incontinence
there is the problem of atonic bladder with overflow incontinence following obstructed labor.
following a successful VVF-repair at following "obstructed" labor a UV-stricture may develop with also overflow incontinence
all these patients consider themselves as fistula patients, and the cause of their "leaking" is obstetric or fistula

therefore **incontinence** has been included as well in the figures

all types require their own special surgical technic, and the prognosis as to closure and incontinence worsens progressively from type I through IIBb

in the first 700 VVF-patients and the first 100 VVF-catheter patients in KATSINA a circumferential defect was not systematically looked for

first, the figures are given for the major groups I, IIA + IIB, III and incontinence for all patients

then, the figures are given for type I, IIAa + IIAb, IIBa + IIBb, III and incontinence from VVF-patient 701 and VVF-catheter patient 101 onwards

RVF

the author is still working on a suitable classification of RVF, but things are not that clear here and the number of RVF-patients is limited; also the sphincter ani trauma is important as well as fixation to cervix/promontory, rectum stricture etc

therefore no figures on RVF are given

fistula type

patients	I	IIA IIB	III	inc
katsina-vvf				
1-100	41	49 + 10		
101-200	34	54 + 11		1
201-300	23	69 + 8		
301-400	28	60 + 10		2
401-500	28	54 + 17		1
501-600	20	66 + 11		3
601-700	25	69 + 5		1
701-800	17	76 + 7		
801-900	25	65 + 7		3
901-1000	17	73 + 5		5
1001-1100	24	60 + 9		7
1101-1200	17	57 + 16		10
1201-1300	17	72 + 6	1	4
1301-1400	19	69 + 7	1	4
1401-1500	23	63 + 4	4	6
1501-1600	21	68 + 8	2	1
1601-1700	12	76 + 8	1	3
kano-vvf				
1-100	16	60 + 15	2	7
101-200	19	69 + 9		3
201-300	14	70 + 9		7
301-400	16	73 + 8	1	2
katsina-catheter				
1-100	29	38 + 1		32
101-200	23	60		17
201-300	21	60 + 2		17
kano-catheter				
1-100	14	63 + 1		22

fistula type

patients	I	IIAa IIAb	IIBa IIBb	III	inc
katsina-vvf					
701-800	17	36 + 40	6 + 1		
801-900	25	42 + 23	5 + 2		3
901-1000	17	36 + 37	4 + 1		5
1001-1100	24	38 + 22	4 + 5		7
1101-1200	17	32 + 25	9 + 7		10
1201-1300	17	34 + 38	4 + 2	1	4
1301-1400	19	35 + 34	3 + 4	1	4
1401-1500	23	43 + 20	2 + 2	4	6
1501-1600	21	39 + 29	5 + 3	2	1
1601-1700	12	39 + 37	4 + 4	1	3
kano-vvf					
1-100	16	44 + 16	11 + 4	2	7
101-200	19	41 + 28	6 + 3		3
201-300	14	30 + 40	6 + 3		7
301-400	16	32 + 41	4 + 4	1	2
katsina-catheter					
101-200	23	51 + 9			17
201-300	21	48 + 12	2		17
kano-catheter					
1-100	14	51 + 12	1		22

fistula type
total figures per VVF-repair and VVF-catheter

total	I	IIA IIB	III	inc
vvf-repair				
2100	456	1372 + 190	12	70
in %	**21.7%**	**65.3% + 9.0%**	**0.6%**	**3.3%**
vvf-catheter				
400	87	221 + 4		88
in %	**21.8%**	**55.3% + 1.0%**		**22.0%**

fistula type
total figures per VVF-repair and VVF-catheter

total	I	IIAa IIAb	IIBa IIBb	III	inc
vvf-repair					
1400	257	521 + 430	73 + 45	12	62
in %	**18.4**	**37.2 + 30.7**	**5.2 + 3.2**	**0.9**	**4.4**
vvf-catheter					
300	58	150 + 33	3		56
in %	**19.3**	**50.0 + 11.0**	**1.0**		**18.7**

size of fistula

introduction

generally the size of the fistula could be related to the amount of tissue loss

but it should not be taken as an absolute measure as there are a lot more factors (tendency to scarring, circumferential defect, previous operation, peroneus paralysis etc) involved

there are "small" large fistulas with almost no other tissue damage and very "extensive" small fistulas

therefore the ultimate size of the fistula is only one of the factors from which the total damage to the woman can be deducted

it would be a task too difficult for this booklet to classify the total obstetric trauma in one handy scheme

methods

the size of the fistula was estimated at operation begin by taking the largest diameter in any direction in a situation between fully stretched and fully relaxed tissues

when multiple fistulas were encountered the diameters were added together; if they were multiple from the beginning we do not know as several patients had been operated before

first, an analysis was made in cm for an exact definition

for working purposes it is better to divide them in **s**mall (< 2 cm), **m**edium (2-3 cm), **l**arge (4-5 cm) and **e**xtensive ($\geq$ 6 cm); however, many times very extensive fistulas were encountered with a diameter of even less than 1 cm

size of fistula in cm

patients	<1	1	2	3	4	5	>6	fistula
katsina-vvf								
1-100	15	18	20	15	8	9	15	100
101-200	12	19	15	11	18	13	11	99
201-300	17	17	16	18	12	6	14	100
301-400	12	19	14	20	9	10	14	98
401-500	22	27	13	8	9	9	11	99
501-600	17	26	15	11	10	7	11	97
601-700	24	24	14	12	7	9	9	99
701-800	14	30	13	16	10	9	8	100
801-900	22	33	14	10	4	8	6	97
901-1000	14	15	21	14	11	8	12	95
1001-1100	19	13	15	13	7	12	14	93
1101-1200	18	22	12	10	7	6	15	90
1201-1300	21	15	13	13	18	6	10	96
1301-1400	20	21	18	9	6	7	15	96
1401-1500	17	23	24	3	8	7	10	92
1501-1600	21	12	19	14	7	13	12	98
1601-1700	21	24	14	12	9	8	8	96
kano-vvf								
1-100	23	15	20	10	3	8	14	93
101-200	22	19	22	14	6	1	13	97
201-300	20	15	21	6	10	5	16	93
301-400	19	15	22	17	7	10	8	98
katsina-catheter								
1-100	35	13	5	8	1	1	7	70
101-200	26	27	18	9	1	1		82
201-300	22	19	22	10	6	2	2	83
kano-catheter								
1-100	30	16	17	7	2	3	2	77

fistula size in small, medium, large and extensive

patients	fistula	S	M	L	E	multiple
katsina-vvf						
1-100	100	33	35	17	15	6
101-200	99	31	26	31	11	8
201-300	100	34	34	18	14	10
301-400	98	31	34	19	14	7
401-500	99	49	21	18	11	14
501-600	97	43	26	17	11	10
601-700	99	48	26	16	9	3
701-800	100	44	29	19	8	6
801-900	97	55	24	12	6	8
901-1000	95	29	35	19	12	9
1001-1100	93	32	28	19	14	12
1101-1200	90	40	22	13	15	7
1201-1300	96	36	26	24	10	9
1301-1400	96	41	27	13	15	6
1401-1500	92	40	27	15	10	9
1501-1600	98	33	33	20	12	6
1601-1700	96	45	26	17	8	5
kano-vvf						
1-100	93	38	30	11	14	8
101-200	97	41	36	7	13	9
201-300	93	35	27	15	16	6
301-400	98	34	39	17	8	7
katsina-catheter						
1-100	70	48	13	2	7	
101-200	82	53	27	2		2
201-300	83	41	32	8	2	1
kano-catheter						
1-100	77	46	24	5	2	2

fistula size in cm
total figures per VVF-repair and VVF-catheter

total fistulas	<1	1	2	3	4	5	>6
vvf-repair							
2026	390	422	355	256	186	171	246
in %	**19.2%**	**20.8%**	**17.5%**	**12.6%**	**9.2%**	**8.4%**	**12.1%**
vvf-catheter							
312	113	75	62	34	10	7	11
in %	**36.2%**	**24.0%**	**19.9%**	**10.9%**	**3.2%**	**2.2%**	**3.5%**

fistula size in small, medium, large and extensive
total figures per VVF-repair and VVF-catheter

total fistulas	S	M	L	E	multiple
vvf-repair					
2026	812	611	357	246	165
in %	**40.1%**	**30.2%**	**17.6%**	**12.1%**	**8.1%**
vvf-catheter					
312	188	96	17	11	5
in %	**60.3%**	**30.8%**	**5.4%**	**3.5%**	**1.6%**

parity at obstetric fistula

introduction

there are several possibilities to develop obstructed labor and fistula:

- **a** the maternal pelvis is anatomically too small or malformed
- **b** the fetal head is anatomically too big or malformed
- **c** the fetus itself is malformed
- **d** an abnormal presentation of the fetal head
- **e** an abnormal lie of the fetus
- **f** any combination of the above situations

the first labor is a test case for the female pelvis, especially when there is no professional obstetric expertise available

therefore it is expected that when the pelvis is too small or malformed the obstructed labor (and fistula) develops immediately at the first delivery of the woman unless the fetal head is small as well

if the woman has delivered once without obstructed labor it seems that at further deliveries the other factors play a role in developing obstructed labor and fistula

once obstructed labor has developed there are four possibilities:

A the obstructed labor is relieved in time, with no fistula formation

B the obstructed labor is relieved, but not in time, with development of a fistula

C the obstructed labor is relieved, but the woman dies from the trauma and exhaustion

D the obstructed labor is not relieved at all resulting into the death of the woman

it is the author's opinion that when no professional obstetric expertise is available, most women with obstructed labor will die in the bush; only a few "lucky" ones survive for the price of a dead infant and a fistula

only how to assess the incidence of obstructed labor in areas without obstetric expertise?

results

in the great majority of the obstetric fistulas (50-60%) it happened at the first labor; the other 40-50% of the obstetric fistulas developed at parity II to XV making it clear that obstructed labor and fistula can occur at any parity whatever the cause

parity at obstetric fistula

patients	nonobst	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
katsina-vvf																
1-100	3	61	6	4	6	1	8	3	2	1	1		1	1		
101-200	9	61	11	3	8	3		1	2		1			1		
201-300	3	58	11	11	4	3	2	2	3	2	1					
301-400	6	61	11	7	2	6	1	1		2		2			1	
401-500	9	47	12	8	10	6	1	4	1	1	1					
501-600	3	40	18	8	8	7	4	7		3	2					
601-700	4	53	7	5	2	5	6	2	6	2	5	2		1		
701-800	6	44	12	14	5	3	3	6	3	1	1	1	1			
801-900	5	50	11	11	4	5	6	2	2	2	2					
901-1000	5	47	13	10	4	4	6	4	2	3	2					
1001-1100	5	49	12	8	2	7	6	6		3		1	1			
1101-1200	12	46	12	8	1	4		5	2	6	1	2				1
1201-1300	3	47	11	10	6	8	4	5			2	2	2			
1301-1400	4	53	6	5	3	6	5	7	5	3	1	2				
1401-1500	4	44	12	13	6	5		6	2	5	1	1			1	
1501-1600	6	45	8	5	5	8	2	5	7	3	2	4				
1601-1700	5	59	8	6	2	4	1	5	5	1		1	3			
kano-vvf																
1-100	12	52	14	4	2	6	3	2	2	2				1		
101-200	5	55	8	3	7	2	5	6	3	2	4					
201-300	10	50	8	5	4	2	6	8	4	1	1				1	
301-400	4	52	13	6	7	6	4	4	1	1	1			1		
katsina-catheter																
1-100	4	46	18	8	3	7	5	1	2	2	3	1				
101-200	3	53	9	10	5	4	2	4	4	2	1	1	1	1		
kano-catheter																
1-100	5	61	11	5	3	2	5	4	1	2		1				
katsina-rvf																
1-100	5	66	12	6	5	1			3				2			

parity at obstetric fistula
total figures per center

total obstetric	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
katsina-vvf															
1610	866	181	136	78	85	50	76	43	40	23	18	8	3	2	1
in %	**53.8**	**11.2**	**8.4**	**4.8**	**5.3**	**3.1**	**4.7**	**2.7**	**2.5**	**1.4**	**1.1**	**0.5**	**0.2**	**0.1**	**0.1**
kano-vvf															
391	223	47	19	21	17	18	20	10	6	7			2	1	
in %	**57.0**	**12.0**	**4.9**	**5.4**	**4.3**	**4.6**	**5.1**	**2.6**	**1.5**	**1.8**			**0.5**	**0.3**	
katsina-catheter															
283	148	32	22	10	19	13	8	13	5	6	4	2	1		
in %	**52.3**	**11.3**	**7.8**	**3.5**	**6.7**	**4.6**	**2.8**	**4.6**	**1.8**	**2.1**	**1.4**	**0.7**	**0.4**		
kano-catheter															
127	77	16	5	8	2	6	5	3	3		2				
in %	**60.6**	**12.6**	**3.9**	**6.3**	**1.6**	**4.7**	**3.9**	**2.4**	**2.4**		**1.6**				
katsina-rvf															
128	89	15	8	9	1	1		3			2				
in %	**69.5**	**11.7**	**6.3**	**7.0**	**0.8**	**0.8**		**2.3**			**1.6**				
katsina-rvf															
42	32	4	2	1		2	1								
in %	**76.2**	**9.5**	**4.8**	**2.4**		**4.8**	**2.4**								

parity at obstetric fistula
total figures per VVF-repair, VVF-catheter and RVF-repair

total obstetric	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
vvf-repair															
2001	1089	228	155	99	102	68	96	53	46	30	18	8	5	3	1
in %	**54.4**	**11.4**	**7.7**	**4.9**	**5.1**	**3.4**	**4.8**	**2.6**	**2.3**	**1.5**	**0.9**	**0.4**	**0.2**	**0.1**	**0.1**
vvf-catheter															
410	225	48	27	18	21	19	13	16	8	6	6	2	1		
in %	**54.9**	**11.7**	**6.6**	**4.4**	**5.1**	**4.6**	**3.2**	**3.9**	**2.0**	**1.5**	**1.5**	**0.5**	**0.2**		
rvf-repair															
170	121	19	10	10	1	3	1	3				2			
in %	**71.2**	**11.2**	**5.9**	**5.9**	**0.6**	**1.8**	**0.6**	**1.8**				**1.2**			

duration of labor

introduction

the duration of labor gives an indication of how long the obstructed labor lasted before it was relieved and of the (non)availability of a functioning obstetric service; of course it also gives an indication of how the woman suffered

an accurate count in hours is not possible, but for the purpose a count in days will do

methods

the woman was only asked how many days she had been in labor and where she delivered, at home or in a hospital; seldomly the woman stated she had been in labor for less than 1 day which for convenience was taken as 1 day

prevention of obstetric fistula

for developing strategies to prevent the obstetric fistula in a certain area the following information would be required

duration of labor at home

how long did it take to diagnose obstructed labor

how long did it take to take a decision what to do further

how long did it take to collect the money for transport/medical care

how long did it take to transport the woman to a health center

how long did it take to refer the woman to a hospital

how long did it take to transport the woman to a hospital

how long did it take to organize for a cesarean section or anything else or to refer the woman to a specialist hospital

how long did it take to transport the woman to a specialist hospital

how long did it take to organize for a cesarean section or something else in the specialist hospital

duration of labor in days

patients	obstetric	1	2	3	4	5	6	7	>7
katsina-vvf									
1-100	97	18	32	17	15	5	1	6	3
101-200	91	17	23	16	19	10	4	2	
201-300	97	19	32	26	9	5	4	2	
301-400	94	12	32	17	16	8	3	5	1
401-500	91	16	28	22	15	3	2	5	
501-600	97	21	26	22	21	3	1	3	
601-700	96	23	28	23	9	8	2	2	1
701-800	94	20	26	20	12	8	3	5	
801-900	95	23	31	17	13	7	2	2	
901-1000	95	21	33	19	9	6	3	4	
1001-1100	95	18	29	22	10	6	1	9	
1101-1200	88	12	26	22	13	6	2	5	2
1201-1300	97	15	31	17	15	3	8	8	
1301-1400	96	22	30	22	11	6	2	3	
1401-1500	96	23	27	21	11	7	2	3	2
1501-1600	94	20	38	16	12	1	1	4	2
1601-1700	95	21	30	19	9	7	3	5	1
kano-vvf									
1-100	88	25	34	23	4	2			
101-200	95	30	29	22	8	3		3	
201-300	90	26	34	18	6	3		2	1
301-400	96	32	34	15	8	1	2	3	
katsina-catheter									
1-100	96	33	30	19	5	8			1
101-200	97	20	34	21	14	4	1	2	1
201-300	98	26	30	20	16	1	2	2	1
kano-catheter									
1-100	95	31	35	17	4	6	1	1	
katsina-rvf									
1-100	95	21	23	23	14	4	3	6	1

duration of labor in days
total figures per VVF-repair and VVF-catheter

total obstetric	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**>7**
vvf-repair								
1977	434	633	416	245	108	46	81	14
in %	**22.0**	**32.0**	**21.0**	**12.4**	**5.5**	**2.3**	**4.1**	**0.7**
vvf-catheter								
386	110	129	77	39	19	4	5	3
in %	**28.5**	**33.4**	**19.9**	**10.1**	**4.9**	**1.0**	**1.3**	**0.8**

sex/condition of infant

introduction

the sex and condition of the infant belong to the most reliable parameters in obstetric fistula history taking as these are something a woman will not forget or lie about

theoretically it could be expected that there might be a slight preponderance of male infants born as males are up to 10% heavier at birth than females

however, right from the beginning there was a male to female ratio of 2:1 which cannot be explained by the heavier birth weight

so there must be other factors/mechanisms involved

the trauma to the infant is even more excessive than to the woman, and only few babys survive perinatally

actually the death of the infant is a protective measure for the woman as then the head (whole infant) shrinks and may pass the birth canal easier

methods

the woman was systematically asked about the sex of the infant born; if it was a twin or triplet birth she was asked about the individual sex of the infants

very seldomly the woman did not know the sex of the infant born as it was completely decayed or she was not told (hospital personnel on strike); the sex is then given as unknown

only the infants which survived the first week are noted down as live

the infants which were born alive but died in the first week are noted down as dead; a special column has been reserved for them

the main question

which are the real factors or which are the mechanisms reponsible for this male to female ratio of 2:1 besides the heavier birth weight?

sex/condition of infant

patients	obstetric	male	?	female	twin/triplet		live male/female		died 1st wk
katsina-vvf									
1-100	97	64		36	3		1	2	1
101-200	91	67		24			4	1	
201-300	97	69		31	1	1	2	1	
301-400	94	59	2	35	2		2	2	
401-500	91	60		32	1		4	1	
501-600	97	70		29	2		3		
601-700	96	61	1	36	2		4		
701-800	94	60	1	34	1		1	5	
801-900	95	64		33	2		3	1	3
901-1000	95	60	1	34			5	5	
1001-1100	95	67		29	1		3	2	4
1101-1200	88	60	1	28	1		5	3	1
1201-1300	97	71		28	2		3	2	2
1301-1400	96	65		32			3	5	
1401-1500	96	55	1	41	1		4	4	
1501-1600	94	69		27	2		7	1	3
1601-1700	95	63		33	1		3	5	9
kano-vvf									
1-100	88	73		15			3	1	3
101-200	95	72		24	1		4	2	2
201-300	90	59		31			3	6	2
301-400	96	69	1	27	1		2	3	4
katsina-catheter									
1-100	96	58		38			7	4	
101-200	97	61		38	2		4	5	
201-300	98	61		38	1		5	8	9
kano-catheter									
1-100	95	65		30			8	8	5
katsina-rvf									
1-100	95	62	2	31			4	5	

sex/condition of infant
total figures per VVF-repair and VVF-catheter

total infants	male	?	female	twin/triplet		live male/female		died 1st wk
vvf-repair								
2004	1357	8	639	25	1	69	51	24
in %	**67.7%**	**0.4%**	**31.9%**			**3.4%**	**2.5%**	**1.2%**
vvf-catheter								
389	245	-	144	3	-	24	25	20
in %	**63.0%**		**37.0%**			**6.2%**	**6.4%**	**5.1%**

sex/condition of infant
total figures per VVF-repair and VVF-catheter

sex	number	dead	alive
vvf-repair			
male	1357	1288	69
in %		**94.9%**	**5.1%**
female	639	588	51
in %		**92.0%**	**8.0%**
unknown	8	8	
in %		**100%**	
total	2004	1884	120
in %		**94.0%**	**6.0%**
vvf-catheter			
male	245	221	24
in %		**90.2%**	**9.8%**
female	144	119	25
in %		**82.6%**	**17.4%**
total	389	340	49
in %		**87.4%**	**12.6%**

interval between delivery and leakage

introduction

in the literature an interval of 5-7 days is given between delivery and the onset of leakage

in the author's experience, the majority of the patients started to leak immediately upon the (still)birth of the infant

this is no surprise as the majority of the patients were in labor $\geq$ 2 days

even if an obstetric fistula had not developed yet, the necrotic bladder tissue (mostly involving the closing mechanism) will prevent the closing mechanism to function normally

however, it must be said that this parameter is not totally reliable in this study:

a memory of the patient after long time of leakage
b several patients were unconscious for days (eclampsia)
c most of the CS patients had a catheter for some days
d it could not be objectively checked when the leakage started

still all these factors considered, it seemed that the majority of patients started to leak the same day as they delivered, i.e. immediately

methods

the patient was asked when she started to leak: immediately, the same day she delivered; exactly after how many days if it was not immediately and if she was really dry in between and could pass urine normally

sometimes the patients did not know as they were unconscious (eclampsia), but then their (grand)mother was asked if around

when they had undergone a cesarean section (hysterectomy) they were asked the same questions and if the leakage started immediately upon removal of the catheter

it was considered immediately when the leakage started the same day or the leakage started immediately upon removal of the catheter

so all in all this parameter can be considered as accurate as possible in this study

interval between delivery and onset of leakage

patients	obstetric	imm	1	2	3	4	5	6	7	8	9	>10
katsina-vvf												
1-100	97	81	1	4	3			1	2	1	1	3
101-200	91	79	1	2	2	1	1	1			4	
201-300	97	81	2	3	2		1	1	3			4
301-400	94	84	1	1				1	3			4
401-500	91	77		1	3		2	1	5	1		1
501-600	97	86	2	2	2		1	1	1			2
601-700	96	81		2	4	2	4	1		1		1
701-800	94	81	4	2		1		1			1	4
801-900	95	83	1	4		1			1			5
901-1000	95	81	2	3	3	1	2		1			2
1001-1100	95	68	4	4	2	2	2	1	5	2		5
1101-1200	88	69	2	4	2	1	1		3	2	2	2
1201-1300	97	75	6	5	2	1	1		3	1		3
1301-1400	96	67	2	6	4	2			3	2	1	9
1401-1500	96	67	4	5	2	2	3		5	1		7
1501-1600	94	71	3	5	3		1		3	4	1	3
1601-1700	95	66	5	6		1	1		4		1	11
kano-vvf												
1-100	88	63	6	2	4		1		1	1	1	9
101-200	95	62	4	4	8			1	8		1	7
201-300	90	51	4	8	2	2	7	1	4	1	1	9
301-400	96	55	3	10	3	2	1	1	6		1	14
katsina-catheter												
1-100	96	74		4	1	3	4	1	2			7
101-200	97	49	6	10	3	2	3		11	2		11
201-300	98	52	9	3	6		4	2	7	1	2	12
kano-catheter												
1-100	95	42	6	7	5	2	2	2	7	2	1	19

interval between delivery and onset of leakage
total figure per VVF-repair and VVF-catheter

total obstetric	**imm**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**>10**
vvf-repair											
1977	1528	57	83	51	19	29	15	62	13	11	109
in %	**77.3**	**2.9**	**4.2**	**2.6**	**1.0**	**1.5**	**0.8**	**3.1**	**0.7**	**0.6**	**5.5**
vvf-catheter											
386	217	21	24	15	7	13	5	27	5	3	49
in %	**56.2**	**5.4**	**6.2**	**3.9**	**1.8**	**3.4**	**1.3**	**7.0**	**1.3**	**0.8**	**12.7**

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