



PATIENT INFORMATION FILE:

## TOE DEFORMITY, or “CLAW-TOE”

*Your surgeon has suggested that you undergo surgery for your foot-and-ankle problem.*

*The main lines of this treatment have been explained to you: the alternatives, how the operation will be conducted, the postoperative course, the expected results and also the possible complications. The present file is a supplementary document that your surgeon would like you to have, setting out the key issues concerning your particular pathology and enabling you to check over the important points about the future operation.*

*Your surgeon will be available to see you before the actual operation, to answer any further questions you may have.*

**File drawn up by the medico-legal commission of the French Foot and Ankle Surgery Association (AFCP)**

**This file is also available on-line at:**

**AFCP (<https://www.afcp.com.fr/infos-publiques/infos-patients/>)**

**SOFOT (<http://www.sofcot.fr/Infos-public-Patients>)**

**ORTHORISQ (<http://www.orthorisq.fr>)**

**Translation by Pr Mc Gill (Lyon University)**





Claw toe is a deformity, either horizontal or vertical, of the lesser toes. It distorts the pressure of the foot on the ground and in the footwear, creating painful "high-pressure" areas (callosities on the soles and/or corns on the toe-joints). We will not deal here with deformities of the hallux (1<sup>st</sup> toe, or "big toe"), but only with the 4 adjacent toes.

## ANATOMY

The toes are the extremities of the forefoot. They play a role in walking, but also in balance and posture.

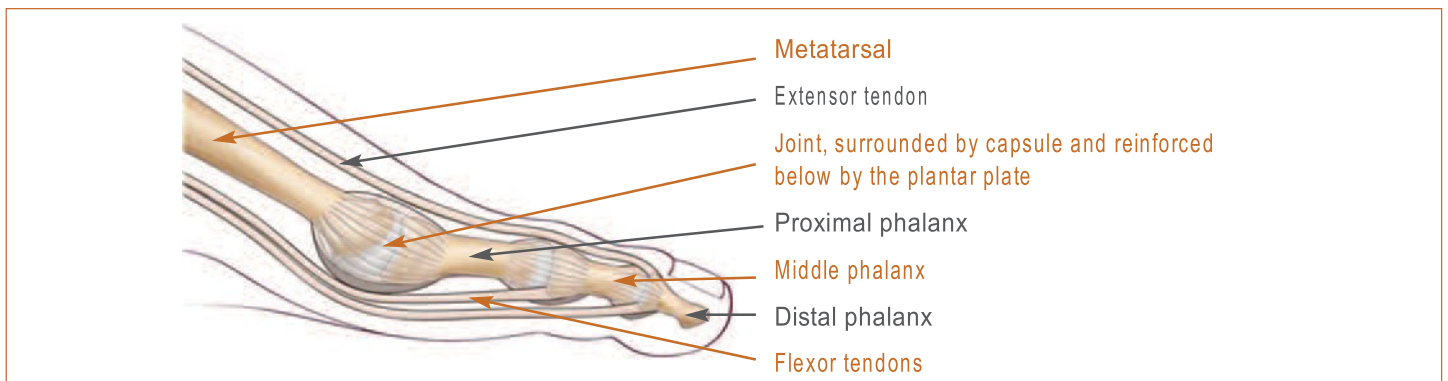
The lesser toes have a bone skeleton comprising 3 phalanges (proximal, middle and distal) prolonging the metatarsals.

There are thus 3 joints:

- **Metatarsophalangeal (MTP)** between the metatarsal and the proximal phalanx;
- **Proximal interphalangeal (PIP)** between the proximal and the middle phalanx;
- **Distal interphalangeal (DIP)** between the middle and the distal phalanx.

These joints are held together by a fibrous system, known as the "joint capsule", allowing the two bones to move against one another, reinforced laterally by ligaments. The lower (plantar) part of the joint is reinforced by a thicker structure, the "plantar plate", enhancing resistance to pressure.

Joint motion is provided by the extensor and flexor tendons, which respectively stretch and fold the toes. These tendons insert onto the phalanges, flexors below and extensors above.



The distal phalanx has the nail on its upper (dorsal) side, and the pulp on its lower (plantar) side.

The toes have many important nerve endings coming from the two digital nerves (one on each side of the toe), which divide into microscopic nerve fibers ensuring sensitivity. This rich nerve supply accounts for the severe pain accompanying toe pathologies.

## THE PATHOLOGY

In the normal situation, the toes are aligned with one another, with the pulp touching the ground. Motion is more restricted than in the fingers of the hand, but the toes can still be raised or flexed against the ground.

"Claw-toe" refers to any horizontal and/or vertical deformity, due to defective bone orientation or tendon or joint retraction. Deformities may be isolated, involving just 1 or 2 toes, or may be due to general and especially neurological pathology or to deformity of the big toe.

There is a great variety of deformities, which may involve the 3 phalanges, the 3 joints (metatarsophalangeal and proximal and distal interphalangeal) and the 2 tendon systems (flexor and extensor). Among all these possible deformities, we distinguish:

- **"clinodactyly"**, or curved toe: a horizontal deformity, where the toes deviate inwards or outward;
- **"hammer toe"**: a flexion deformity affecting the DIP joint;
- **"total claw toe"**: a flexion deformity affecting both PIP and DIP joints.

Claw-toe deformity may be reducible (supple claw-toe) or irreducible (fixed claw-toe).



## CLINICAL PRESENTATION

Claw-toe leads to excessive pressure between the toes, between toes and ground and between toes and footwear. Unlike normal weight-bearing, where the pressure is between the ground and the fleshy pulp that acts as a shock-absorber, in claw-toe there is hyper-pressure in a narrow exposed area, which is especially painful.

Clinically, this hyper-pressure leads to localized pain and hyperkeratosis (callosities or corns). Corns occur mainly on the dorsal side of the joint, but can also arise at the end of the toe, at the pulp and nail (in distal claw-toe) or on the lateral sides (in interdigital impingement), forming a soft corn.

Corns may progress to become skin ulcers that are liable to cause infection in the bone (osteitis), joint (arthritis) or tendon and fatty tissue (phlegmon).

## DIAGNOSIS

Patients consult a specialist because of pain in the toes, corns, skin ulcers and footwear problems. Diagnosis is essentially clinical, based on deformity of one or more toes, possibly with corns.

X-ray assessment is usually undertaken to study the bones and joints. Ultrasound scan can be helpful to study tissues around the joints (plantar plate) or tendon structures. CT scan and MRI may be used to study bone and tissue structures.



## NON-SURGICAL TREATMENTS

**Adapting footwear** is a first possibility: wide, supple shoes or perhaps specialized footwear reduce contact and pressure in painful areas.

**Physiotherapy and stretching exercises** can also correct the deformity.

Insoles, provided by a chiropodist-podiatrist, also relieve pain by taking pressure off the painful areas and restoring balanced weight-bearing.

**"Orthoplasties"** (removable, made-to-measure elastic toe spacers) can relieve pain, by repositioning the toes.

## SURGICAL TREATMENTS

Surgery may be suggested when the deformity is too severe and non-operative treatments have proved ineffective. Surgery can be applied to all the components of the deformity:

**-Bone deformity** can be treated by shortening or realigning the bone (osteotomy) so that it reconsolidates in a better position.

**-Joint deformity** can be corrected by releasing the joint (arthrolysis) or by blocking it (arthrodesis) in a correct position, or by removing the joint by resection (arthroplastic resection) or replacing it by an implant.

**-Tendon deformity** can be corrected by sectioning the tendon (tenotomy) or lengthening a retracted tendon. Tendon course or insertion can also be modified (tendon transfer) to correct claw-toe deformity.

**-In severe deformity or when bone or tendon structures are too badly damaged** for non-operative treatment to be feasible (infection, joint and/or bone destruction), more radical surgery, such as toe amputation, may sometimes be performed.

### > ANESTHESIA

It is essential to have a preoperative consultation with an anesthetist. This doctor will explain to you the different possible types of anesthesia, adapted to the surgery you are to undergo and to your general health status.

During this consultation, the anesthetist will also check any medical treatments you are taking. New medications may be prescribed, before and/or after the operation; the most common are anticoagulants, antibiotics and/or anti-inflammatory drugs – and of course each has its own specific risks.

For the surgical operation, anesthesia may be **"locoregional"** (anesthetizing a segment of the leg from the tibia down to the toes), **"spinal"** (anesthetizing the pelvis and legs with an injection between two vertebrae), or **"general"**.

Blood transfusions are rarely needed in this kind of surgery, which does not involve any heavy bleeding.

## HOSPITAL ADMISSION

You may be admitted on an outpatient basis, with just the day in hospital, or for a few days, depending on the type of operation, any associated health issues and/or your medical or home situation.

### > OPERATIVE TIME

Operative time varies greatly, depending on the degree of deformity and the number of toes to be operated on. On average, the operation takes about an hour.



### > IN THE OPERATING ROOM

You will be positioned on your back, allowing the surgeon to operate on the dorsal side of the forefoot, between the toes, or even on the plantar side. The length of the incisions varies greatly, depending on the technique, from a few millimeters to an average 10 cm (about 4 inches). **When you come to the operating room, don't be too surprised if you are asked more than once (on arrival, then again when you are being positioned) for your name and which foot is to be operated on: this is the mandatory procedure for all patients, known as the "security check-list" and required by the French Health Authority**

### > SURGICAL TECHNIQUE

Claw-toe can be corrected by two types of surgery:

- **Conventional** or "open" surgery uses an incision a few centimeters long to operate on the tendons, bones or joints under visual control.
- **Percutaneous** surgery uses incisions just a few millimeters long to operate on the tendons, bones or joints by specific instruments, usually under radiological control.

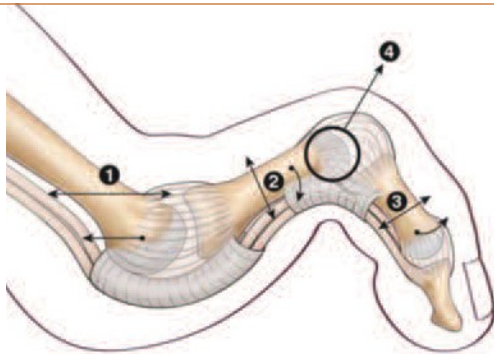
These two types of surgery are not "rivals"; which is used depends on the deformity and your surgeon's habits, and they can even be associated in a single operation.

The aim of surgery for claw-toe is to operate on all the components of the deformity, whether tendon, bone or joint. Depending on the deformity, various procedures may be used.

#### - Bone and joint procedures

- **Osteotomy** (whether to shorten the bone or not) consists in cutting a bone segment so that it can reconsolidate in a position that corrects the deformity. "Shortening" osteotomies remove a variable length of bone, so as to reduce the deformity; or osteotomy may reorient the bone segments. Osteotomy may be performed on the three phalanges or the metatarsal.

- **Arthroplastic resection** generally uses a dorsal incision, to ablate (resect) the deformed joint surfaces. This



1: Metatarsal shortening osteotomy

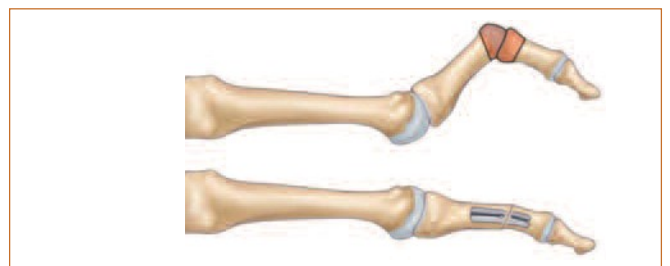
2: Proximal phalanx osteotomy, repositioning the phalanx toward the ground

3: Middle phalanx osteotomy to reposition the phalanx in dorsiflexion

4: Arthroplastic resection of the head of the proximal phalanx, to "refit" the joint.

leaves an empty space, in which the bone segments can be realigned. A fibrous scar forms in this space within a few weeks, helping maintain correction.

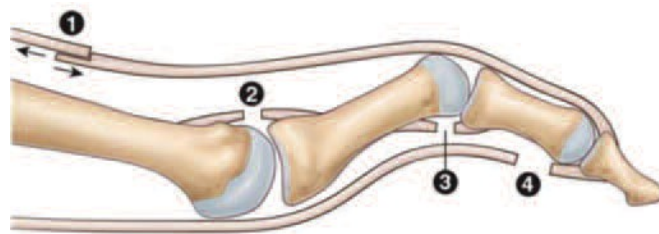
- **Arthrodesis** (fusion), with or without an implant, consists in blocking and consolidating the joint in the correct position. The incision, which is usually dorsal, enables the joint surfaces to be reached before blocking them with a temporary pin, screws or implants (metallic or other).





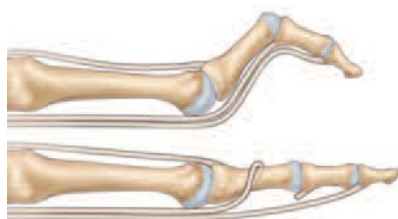
- **Joint prostheses** are used to replace the damaged or defective joint, but are not available for all types of joint and deformity.
- **Metatarsal head resection** consists in resecting just the joint surface (head) of the metatarsal so that fibrosis can occur between the resected surface and the base of the phalanx.
- **Arthrolysis** consists in releasing the adhesences around the deformed joint so as to reposition it more correctly.
- **Plantar plate repair**: in claw-toe, the involvement of the joints can lead to deformation and distension of the plantar joint structures and notably the plantar plates; repairing these can correct the deformity.
- **Amputation** is the last resort but, in severely retracted, irreducible or infected claw-toe or for fragile patients, it may provide a quick and reliable means of abolishing pain. Moreover, amputating the toes (even all five of them) usually enables rapid resumption of weight-bearing with ordinary footwear.

#### - Tendon procedures



- 1: extensor tenotomy
- 2: dorsal MTP3 capsulotomy; plantar PIP capsulotomy
- 3: tenotomy of proximal phalanx flexor
- 4: tenotomy of middle phalanx flexor

- **Tenotomy** consists in cutting the retracted tendon that is causing or maintaining the deformity.
- **Tendon lengthening** consists not in cutting but in lengthening certain tendons, to decrease the traction they exert on the bone segments onto which they are inserted.
- **Tendon transfer** consists in deviating a retracted tendon that is maintaining the deformity and reinserting it in a position where it will actually combat the deformity.



Example of short flexor (flexor digitorum brevis) tendon transfer from the middle phalanx flexor to the proximal phalanx flexor.

These techniques sometimes use surgical material to stabilize the correction: screws, pins, metal or non-metal implants. Sometimes, notably in the case of certain types of pin, the material may be visible and removed after a few weeks; in other cases the implanted material is intended to be left in place.

During the operation, your surgeon may come up against an unforeseen or unusual circumstance that requires a complementary procedure or a procedure not initially planned for. Once the operation is over and you have come out of the anesthesia, you will be told exactly what the surgeon did.



## AFTER THE OPERATION

> **PAIN** is of variable intensity after surgery, depending on how heavy the operation was: a procedure involving the bones and soft tissues of all 5 toes is going to be heavier than a tendon procedure for just one toe. Strong pain-killers may be used just after surgery, but as a rule you will be able to return home with just simple analgesics. Anticoagulant injections may also be prescribed, depending on your state of health and how heavy the operation was.

> **WEIGHT-BEARING** is usually authorized with a special postoperative shoe or a broad shoe. In more fragile patients, crutches can help prevent falls. Generally, you will be autonomous as far as everyday home activities are concerned, but driving and sport may not be possible at first.

> **DRESSING** is meticulously performed during the operation, according to your surgeon's habits, and usually should not be changed later. In the case of percutaneous surgery in particular, the dressings are more specific and will be performed by your surgeon and his or her team. However, if there is care to be performed at home, it is important to ensure that the scar remains hygienically clean so long as the sutures are still there and the wound is not fully healed. Clean hands are essential, and you must never touch the scar without first washing your hands. Make sure that there is somewhere at your home for the nurse to wash her hands, or a hydroalcoholic cleanser.

> **PREVENTION OF PHLEBITIS:** Anticoagulant injections are rarely prescribed in this kind of surgery, but may be necessary depending on your surgeon's and anesthetist's assessment of your general health.

> **POSTOPERATIVE EDEMA** (swelling of the foot and toes) is normal after foot surgery, and does not count as a complication. It is essential for it to be treated, not just to relieve pain but also to improve scar healing: a certain rest period, with the foot raised and wearing compression socks or stockings may be useful. The edema can last a long time (weeks or months), with no lasting harm, although you may need to adapt your footwear in the meantime.

### > POSTOPERATIVE CONSULTATIONS

Your surgeon will carry out regular clinical, radiological and biological check-ups, and enter the results in your medical file.

The data in your file (rendered anonymous) may be used in medical studies or scientific communications or publications by your surgeon, in line with the French "Jardé" law of March 2012 (Decree 2016-1537). If so, your surgeon will ask for your specific consent, and this will be recorded in your file.

You will be followed up for several months, to check healing, renew dressings and guide the consolidation of the toes in the correct position.

These consultations are also an opportunity to check on pain-killers and launch rehabilitation, either by yourself or with a physiotherapist. You will also be advised on footwear.

## WHAT YOU CAN EXPECT FROM THE OPERATION

Without treatment, claw-toe worsens. Footwear becomes ever more problematic or even impossible, making it hard for you to walk. The aim of surgery is to have horizontal toes with the pulp in contact with the ground.

However, the result of the operation obviously depends on the initial deformity: in mild claw-toe, the aim is complete reduction, while in more severe cases the aim is to allow comfortable wide footwear.

## THE RISKS

*No surgery is ever without risk. Whatever the precautions, "zero risk" does not exist. When you decide to be operated on, you need to be aware of this, and to weigh the risks against the expected benefit: this is known as the "risk/benefit ratio".*

However skilled your surgeon and the team, there is always, unfortunately, a risk of failure with any treatment. Failure here may mean recurrence of symptoms or even worsening, or other more severe risks. These risks may just be a matter of bad luck, but



they can also be aggravated by your particular health issues, whether known to you or not, and whether local or general. It would not be possible to detail here every conceivable complication, but we have listed below the most frequent or the most serious risks that may arise with your pathology.

#### > STIFFNESS

Any joint surgery can induce temporary or definitive stiffness. This may require physiotherapy or even re-operation.

#### > POOR OR FAILED BONE HEALING

Surgical treatment of your pathology is based on bone healing, which is a biological phenomenon. However, it may fail or be delayed: an arthrodesis (blocking the joint) or osteotomy (bone cut) may fail to consolidate, and surgical revision may then be necessary..

#### > CHRONIC PAIN AND COMPLEX REGIONAL PAIN SYNDROME

In any medical or surgical treatment for pain, some pain may unpredictably persist and other pains may worsen. These chronic, long-term phenomena may constitute a "complex regional pain syndrome" that may progress for several months, sometimes with trophic or joint sequelae.

#### > INFECTION

Despite all precautions in terms of disinfection and skin preparation, any surgical incision incurs a risk of microbial contamination leading to infection, early on or much later. Antibiotics are often needed, or surgical revision, with risk of pain or functional impact. Factors such as diabetes, smoking or immunodepressant treatments (corticosteroids, etc.) may increase the risk of infection.

#### > SCAR HEALING DISORDER

Despite all the care your surgeon takes to look after the surgical wound and all nursing care, there can be problems of scar healing, sometimes induced by general or local pathologies such as diabetes or circulation disorder. Wound healing may thus be delayed or defective, leaving a blemish or unhealed scar or skin necrosis. These scar issues can also lead to infection.

#### > SMOKING (NICOTINE INTOXICATION)

Nicotine intoxication is a major risk factor in foot and ankle surgery, notably causing healing problems, infections and thromboembolic complications and hindering bone healing.

**Complete cessation of smoking is recommended for 6 weeks before and 6 weeks after surgery. If need be, do not hesitate to consult your family doctor about this..**

#### > MATERIAL DISASSEMBLY AND BREAKAGE

Your operation involves moving bone segments, which may require surgical material such as plates, screws, pins or wires. Like any material, these implants can incur complications, due to their fragility (breakage) or displacement under mechanical stress on the structures onto which they are implanted, which can lead to loss of correction.

This surgical material may thus require revision in case of displacement or complications.

Finally, well after the operation and the immediate postoperative period, when your pathology has been resolved, the material can sometimes be removed in a scheduled operation, depending on its location and whether it is causing local discomfort or impingement.

#### > THROMBOEMBOLIC COMPLICATIONS

Any surgery, and especially in the legs, can lead to a blood clot blocking the veins and causing phlebitis. The clot can even get into the circulation system of the lungs and cause an embolism that may have very serious or even fatal consequences. Prevention may involve anticoagulation therapy, depending on the type of surgery and your general health status.

#### > ADJACENT COMPLICATIONS

As the surgical site is close to bones, tendons, blood vessels and nerves, the operation may directly or indirectly impact these elements: hemorrhage, hematoma, paresis, paralysis, loss of sensitivity, restriction of motion, joint stiffness, etc. Given the position of the scar, injury to a small nerve can lead to loss of sensitivity or to persistent pain. In some cases, revision surgery





may be necessary: to drain a hematoma, decompress a nerve, release a tendon...

### > MEDICATION COMPLICATIONS

Following surgery, you may be prescribed certain specific medications: most often, anticoagulants, antibiotics, pain-killers, or anti-inflammatory drugs. These obviously all come with their own risks, that can be serious and sometimes unpredictable.

### > POSTPONEMENT OF SURGERY:

Finally, your operation may need to be postponed, for your own safety, in case of:

- an illness just before admission;
- recent change to your usual treatment;
- a wound or infection near the intended operative site;
- forgetting or failing to respect the instructions given to you by the surgeon and anesthetist;
- unexpected unavailability of the material and equipment needed for the operation, or unforeseen incident in the operating room liable to interrupt surgery, including after anesthesia.

## Frequently asked questions

### *"Is it possible to operate on both feet at once?"*

This can sometimes be possible, depending on your surgeon's habits, the technique employed and the type of anesthesia used to operate on both feet in the same step. Ask your surgeon, who can explain and advise on what is the reasonable thing to do in your situation.

### *"If both my feet are operated on, will the pain be worse and the sick leave longer?"*

Regarding pain, the treatment is usually the same, adapted to the operation. The sick leave period is also usually the same, barring the unexpected (such as delayed bone healing).

### *"How am I going to manage at home? When will I be able to drive again?"*

Depending on the operation, you may or may not be able to place your foot on the ground, with or without crutches. If you have had forefoot surgery, you will be able to walk, using one or two special shoes prescribed by your surgeon, to protect your foot during bone healing and scar healing.

### *"When can I start driving again?"*

While wearing this kind of "medical shoe", driving is strongly advised against; your surgeon will be able to explain the possibilities of driving again, according to how you progress.

### *"What should I do if my foot or ankle becomes painful again or swells up (edema)?"*

Edema is frequent, and usually not pathological.

In a few cases, if it is accompanied by severe pain, it may be the sign of some problem with healing or with the bone (such as material displacement).

### *"What should I do in case of fever or a problem with the scar?"*

If you develop fever, this might be a sign of infection.

If, when you change dressings, your scar is red, inflamed or suppurating, consult your surgeon as quickly as possible, for advice and adapted treatment - local or general (antibiotics).



***"What should I do if I have pain in the calf or difficulty breathing?"***

These signs may point to a blood clot in a vein (phlebitis) or a clot migrating to the lung (pulmonary embolism), which can have serious consequences.

The risk is greater if, because of the type of operation, you are not allowed to put your foot on the ground; in that case, your surgeon will have prescribed protective medicines (anticoagulants) for you – but even so, the risk remains and this kind of sign is an alarm.

**Generally speaking, any new symptom means you should consult either your family doctor or your surgeon or, in case of emergency, the center in which you were operated on.**

**If you cannot reach them, do not hesitate to dial 15 for the emergency medical service, which will guide you.**