

Treatment of *Hallux Valgus*

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As in many other conditions that affect the musculoskeletal system, pain and deformity are the two factors that prompt *hallux valgus* patients to visit a doctor in search of a remedy. Any treatment we propose should therefore achieve these two purposes: the suppression of pain and the correction of the deformation. In 50% of cases, attaining the latter without the former far from leading to a success, leads to utter failure.

Given the nature of *hallux valgus*, treatment should be at the same time pathogenic and symptomatic and should, as far as possible, address the different factors that contributed to the inception of the condition as well as the sequelae that have ensued. In other words, when treating the deformity we should not only focus on removing the prominence of the first metatarsal and correcting the toe's *valgus* deformity that gives its name to this condition, but we must also pathogenetically address the inward deviation of the first metatarsal and the concomitant widening of the rear-foot.

We must also strive not to ignore any of the elements that play a role either in the pathological or morphological aspects of *hallux valgus*. For example, we cannot turn a blind eye to the metatarso-phalangeal osteoarthritis that frequently accompanies this condition since ignoring it could lead to the persistence of discomfort that would cause the patient to be dissatisfied with the procedure, even if a good cosmetic result was obtained.

The multiplicity of elements to be considered when treating *hallux valgus* has given rise to a panoply of therapeutic procedures among which we must carefully select the one that we deem most useful given the intensity of the condition, the age of the patient, etc.

A mistake in the selection of the right method or the use of a defective technique will result in the failure of treatment and will contribute to spreading the notion that it is not really worth subjecting oneself to *hallux valgus* surgery since the result will be poor anyway. Incidentally, this is a fairly pervasive notion among *hallux valgus* patients. If we want to succeed in our treatment, we must pay great atten-

tion to detail and take the same pains as if we were treating one of the large joints. We shall be considering primarily constitutional *hallux valgus*.

PROPHYLAXIS

To carry out the prophylaxis, we need to analyze the etiopathogenetic factors that have marked the development of *hallux valgus* and address them as soon as possible. We should above all strive to halt the fanning out of the metatarsals by using appropriate insoles and indicating exercises that improve the tone of the plantar muscles. Anti-physiological footwear should be avoided as should be excessively high heels in cases rated as intermediate *hallux valgus* by Esteban Múgica².

TREATMENT

We will not discuss conservative treatment since once *hallux valgus* has developed, we believe that non-surgical portions should be ruled out.

Surgical treatment

We have mentioned the large amount of surgical methods that are available; some authors mention over one hundred techniques to surgically treat *hallux valgus*. In this paper we shall not make a list or provide a classification of such methods, estimated at over one hundred. What we will be doing is to carry out an analysis of the factors causing the deformation typically seen in constitutional *hallux valgus* and of the most appropriate treatment for each case, commenting on the most outstanding proposals made by different authors. At the end of these comments, we will discuss procedure that in our opinion should be considered the treatment of choice for this condition.

Analysis of the deformity. Treatment options.

The main elements that make up this condition are as follows:

Published in the *Revista de Ortopedia y Traumatología* vol. 4.1, sect. 2.o, pages 234-244, 1960.

- A) An inward deviation of the first metatarsal.
- B) A prominence at the level of the head of the first metatarsal.
- C) Outward deviation of the toe.
- D) Secondary deformities in the neighboring toes.

A) An inward deviation of the first metatarsal

A typical feature is a marked abduction of the first metatarsal, which manifests itself in many cases of *hallux valgus* by a more or less noticeable separation between the first and second metatarsal. This finding is described elsewhere in this paper as a pathogenic factor in this condition. It is important to treat this abduction since the deviation of the toe is, for many authors, a sequela of the pathology.

The main treatment options suggested to correct the deviations of the first metatarsal are as follows:

- a) Taking advantage of the action of the abductor hallucis muscle.
- b) Fibrous fixation of the first metatarsal (Lelièvre⁶).
- c) Corrective osteotomies.
- d) Metatarso-cuneiform joint arthrodesis.

a) Taking advantage of the action of the abductor hallucis muscle.- Since the abductor muscles are attached to the lateral sesamoid and to the lateral portion of the base of the first phalanx (hence the toe's *valgus*) while the head of the first metatarsal is outside that control (metatarsal *varus*), the idea is to transfer the action of the abductors to the metatarsal. The simplest technique of this sort is Mac Bride's⁸, which consists in transplanting the attachment of that muscle to the metatarsal head. It is indicated for adolescents or for adult patients with no osteoarthritis and in whom the metatarsal deviation is amenable to reduction. In these circumstances, Mac Bride's is the technique of choice. In our practice, we take advantage of this muscle's action in a similar way, even in Brandes-type¹ operations. We do not use the Girdlestone method, which pursues the same purpose, since it involves a complex technique and a longer post-op period.

b) Fibrous fixation of the first metatarsal (Lelièvre⁶).- This is a procedure aimed at bringing the first metatarsal closer to the second in cases of *hallux valgus*. The following steps must be followed: the whole of the distal end of the metatarsal and of the proximal end of the phalanx are released through a medial longitudinal incision at the site of the metatarsophalangeal joint. Subsequently, at the lower or plantar region, all soft tissue is released until contact is made with the second metatarsal. The same operation is performed at the superior or dorsal region. Two flaps will remain: a superior one that includes the glenoid labrum, the lower part of the joint capsule, the extensor tendons and the dorsal aponeurosis, and an inferior flap that comprises the glenoid labrum, the lower part of the capsule, the sesamoids and the flexor tendons. After moving the head of the first metatarsal towards that of the second, the

medial borders of both flaps are superposed so that they can hold the two metatarsals together and, at the same time, they are placed once again below the head of the first sesamoid, which in advanced *hallux valgus* cases are dislocated outwards.

c) Corrective osteotomies.- In general, osteotomies are logical operations performed to correct the axis of the first metatarsal when it is too far off-centered and it is completely irreducible. But not all osteotomies are advisable. Any osteotomy that displaces the head of the first metatarsal backward or upwards should be rejected since in neither of these alternatives does the first metatarsal head bear weight. On the contrary, since the head of the first metatarsal becomes functionally suppressed, the weight is borne by the heads of the second and third metatarsals, which results in an overload that induces pain in that area. These considerations completely exclude osteotomies like Ludloff's⁷. When we think that an osteotomy may be indicated, we tend to opt for Hohmann's³, which does not shorten the first metatarsal and displaces the epiphysis inwards and slightly downwards. As a rule, in older adults it is best to avoid osteotomies since they require a long immobilization period and there is normally a concomitant osteoarthritis that makes a hemiarthroplasty necessary. In young patients we do not normally need to perform osteotomies since the results obtained with the above mentioned treatment of soft tissues is generally outstanding.

d) Metatarso-cuneiform joint arthrodesis.- It has the same indications as an osteotomy. Its main drawback is its long immobilization period. It should be avoided, as we said above, when a hemiarthroplasty is needed to treat a patient for osteoarthritis. Pathogenetically it is a correct procedure, although we have had no experience of it.

B) A prominence at the level of the head of the first metatarsal.

We systematically perform a resection of the area sometimes known as the exostosis, which is the prominent part of the first metatarsal that extends up to a vertical groove at the level of its facet joint. We must not limit our treatment of *hallux valgus* to this sole intervention, which is what some authors do. But we do not think that there is any reason to follow Hohmann³ and refrain from excising this prominence. We nevertheless do not consider it necessary to excise the fatty pouch created by the prominence; we not only leave it in place but also use it as interposition material in the hemiarthroplasty, provided that it is not infected.

C) Outward deviation of the toe.

This is the deviation that gives its name to the deformation that is the subject of this paper. As with any other deformity, we should first reduce it and then maintain this reduction restoring muscular balance so that the toe remains straight. The extensor hallucis muscle should therefore act

following the metatarsophalangeal axis rather than making the toe's *valgus* more marked. The abductor hallucis muscle should counterbalance the abduction force, which it cannot do if it has been displaced under the head. Two methods have been proposed to achieve these two goals depending on the deformation's degree of reducibility:

a) Acting simply on the soft tissues, by creasing or tensioning the internal aspect of the capsule, and in the case of Hohmann's³ technique, carefully reimplanting the abductor muscle. Mac Bride's⁸ procedure, which suppresses the action of the abductor over the phalanx, can also address this deformity satisfactorily.

b) Acting on the bony structures by performing a hemiarthroplasty, which shortens the metatarsophalangeal bony complex and thereby promotes the correction of *hallux valgus* since the procedure relaxes the capsule, the ligaments and the tendons of motor muscles of the toe, making it possible to correctly position the latter thereby restoring muscular balance, a necessary condition for correction to be stable. There are of course two types of hemiarthroplasty: in one of them (known as the Hueter⁴ or Mayo⁹-type) resection is made at the expense of the metatarsal, and in the other (known as the Keller⁵ or Brandes¹-type) it is made at the expense of the phalanx.

We reject those procedures in which the resection is at the expense of the metatarsal head since this would eliminate a vital support structure and thereby overload the heads of the second and third metatarsals, which would dig into the sole of the foot and cause pain that is difficult to treat. We have often seen patients in whom the Hueter procedure⁴ led to a poor functional result although the cosmetic result was excellent. In spite of the fact that even today some colleagues still defend this procedure, we believe that it should be discarded. As it is important to preserve the foot's ordinary support structures, resection should be made at the expense of the phalanx since this causes a minimal disruption to the normal physiological and stationary mechanism of the foot. The advantage of this procedure is that it allows a proper alignment of *hallux valgus*, however inveterate or severe it may be. Since post-op recovery is very brief, this procedure is specially indicated for elderly patients.

D) Secondary deformities in the neighboring toes

Deformity in these digits is due to the spatial conflict created by the toe's *valgus*. Once the big toe's deformity has been addressed, the neighboring toes, especially the second one, can be returned to their normal positions. When the deformity of these neighboring toes is deemed irreversible, we must straighten them during the same surgical act at which the *hallux valgus* has been corrected. These digits should never be amputated.

The toes are not ornamental elements. They are key players during foot lift-off in the final part of the stance phase of gait. Moreover, it should be said that, amputating

the second toe for example achieves nothing since we all know that after some time *hallux valgus* will increase, with the big toe taking up the space gained by the amputation of the neighboring digit.

An analysis of the causes of pain and its treatment

Hallux valgus patients may feel discomfort stemming from three possible sources:

- a) Bursitis.
- b) Metatarsophalangeal osteoarthritis
- c) Overload of the second and third metatarsal heads

We should also consider the discomfort felt at the level of the second toe which, as a result of a spatial conflict derived from the deviation of the big toe may overlap the latter and be compressed by the shoe toe cap. For the same reason it may have suffered a hammer toe deformity with the consequential discomfort.

a) The discomfort caused by *bursitis* is the most frequent and it disappears automatically with the removal of prominence of the metatarsal head on the edge of the foot (incorrectly named *exostosis*). Therefore, it is not necessary to abound in further details.

b) The logical approach to ease the pain caused by subluxation and the secondary osteoarthritis of the metatarsophalangeal joint is a hemiarthroplasty at the expense of the phalanx; in this case a para-articular procedure is sufficient.

Although we mentioned it above, we would like to insist that resecting the metatarsal head is contraindicated since we have seen cases in which this has suppressed the pain induced by the osteoarthritis all right, but triggered a metatarsalgia in return. It is only normal that this should happen given the overload caused on the central metatarsals when modifying the anterior arch. We should emphasize once again the importance of the first metatarsal in supporting the forefoot and bearing weight on it. We know that in a stationary position it bears most of the body's weight and at some moments during gait it bears the full body's weight.

To treat overload metatarsalgia induced by the heads of the second and third metatarsals, we should use insoles equipped with metatarsal pads. We strongly disapprove of resecting the second, third and fourth metatarsal heads since they are all weight-bearing structures (even if they only bear half the weight the first metatarsal does) and suppressing them would mean overloading the outer structures thereby shifting the pain rather than abolishing it.

As far as the pain in the second toe is concerned, in those cases in which a severe deviation of the big toe creates a spatial conflict – making it difficult for patients to put on their shoes, we believe that treatment must be causal, i.e. one must treat the *hallux valgus* and refrain from excising the second digit, as our experience has shown us.

From what has been said so far one might infer that we favor two kinds of procedure. If the patient is young and does not yet show signs of osteoarthritis and the deformity is easily reducible, we recommend carrying out a Mac Bride-type procedure⁸. Conversely, in adult patients with metatarsophalangeal osteoarthritis and a difficult-to-correct deviation of the big toe, we consider that the treatment of choice must be a Keller⁵-Brandes¹-type procedure, which should address the deviation of the first metatarsal taking advantage of the action of the abductor hallucis muscle. In what follows we shall provide the details of these two procedures.

I. Young patients with no metatarsophalangeal joint osteoarthritis and a reducible hallux valgus.

Anesthesia: We tend to use general anesthesia. When we do resort to local or regional anesthesia, we usually combine it with a basic anesthetic in order to be able to use a pneumatic tourniquet that allows us to perform the procedure more carefully.

We perform a curved incision of about 5 cm centered on the first metatarsal head. We expose the capsule and the fatty pouch and visualize the abductor hallucis tendon. We perform a linear incision into the capsule and expose the first metatarsal head. We can now see the gap that separates the first metatarsal head from the prominence some authors call exostosis. We subsequently section the exostosis following the longitudinal direction of the metatarsal. We temporarily close this incision with towel forceps. We make another small longitudinal incision in the first interdigital space, which enables us to approach the abductor hallucis muscle; before we do this we need to forcefully pull apart the two metatarsals. We then identify the lateral sesamoid, which must not be excised, and section the abductor's attachment on the lateral aspect of the base of the phalanx. We pull the abductor upwards and outwards separating it from the sesamoid and short flexor muscles with which it is then combined (fig. 1 A). We drill a lateral-lateral hole into the first metatarsal head through which we pass the abductor tendon to which a stitch with a Bunell-type wire has been previously applied (Sanchís-Olmos & Vaquero¹⁰) (fig. 1B y C). This helps us draw the head of the first metatarsal closer to that of the second. We can make sure that both metatarsal heads are drawn together by applying a couple of catgut stitches between the lateral aspect of the metatarsophalangeal joint capsule of the first toe and that of the second. The skin is closed with silk suture, usually with mattress stitches. A compressive bandage reinforced with plaster is used to hold the metatarsal heads firmly together. At three weeks the bandage is removed. Footwear with a straight internal border is indicated.

II. Adult patients with metatarsophalangeal joint osteoarthritis and an irreducible hallux valgus deformity.

Anesthesia and a pneumatic cuff are used as described for the previous technique. A curved lateral incision is per-

formed. No skin should be excised even if it appears diseased or too abundant since the shiny skin that covers the bunion has poor tropism and is easily necrotized. The skin surplus later shrinks back and disappears of its own accord. Once we have separated the margins of the wound, we use a long U-shaped fascia cum pouch flap; the apex of the flap is at the level of the middle of the phalanx and its base is the metatarsal, directly behind the exostosis (fig. 2A). At the tip of the metatarsal we can see the slot that separates the exostosis from the bone's head. We apply a curved chisel to that slot and section the exostosis following the longitudinal direction of the metatarsal and the extension of the shaft's medial border. We then release the proximal portion of the phalanx from the capsular attachment detaching the periosteum that covers it in that area and striving not to injure the long flexor. Using a sharp small costotome we resect the proximal third of the phalanx (in cases of very severe deformities up to half the phalanx may be excised) (figs. 2B y 3B). We then apply a metallic stitch to the apex of the flap, from which – as has been said – the fatty pouch should not be excised unless infected. With the curved needle we pass the stitch through the lateral capsule wall at the level of its most proximal portion; this stitch should be applied as deep as possible so as to pass it through the abductor hallucis tendon. When tying the knot we must make sure that the metatarsal head is drawn outwards, closer to that of the second metatarsal (figs. 2 C y 3 C). The medial capsular incision is easy to close since it remains lax because of the lack of a phalangeal base, as shown in the diagram. The abductor hallucis tendon completes the coverage on that side (fig. 2 D).

Skin suture.- We should first slightly detach the wound margins so that they can be perfectly matched. Black silk should be used for suturing. We recommend a mattress stitch. Suturing should proceed carefully so that the scar has a good appearance. An abnormally-healed adherent scar resulting from a poorly performed suture can at times be more painful than the *hallux valgus* that gave rise to the treatment in the first place.

Continuous traction.- In order to correctly align the toe and at the same time prevent the skin creases that form as a result of the partial phalangeal resection, some authors favor moderate continuous traction through the nail or the ball of the toe with a stainless steel wire that is adapted to a ring attached to the bone. The instrument is left in place for around ten days. We agree with these authors and apply traction systematically. Many authors claim that traction has earned them better esthetic results. The traction should be used in such a way that the toe should be pulled at along a straight axis and in slight plantar flexion.

Bandage.- Any type of bandage may be applied, provided that the big toe's correction is maintained. However, we prefer plaster, paying particular attention to the foot's modeling. The idea is to restore the anterior arch, keeping

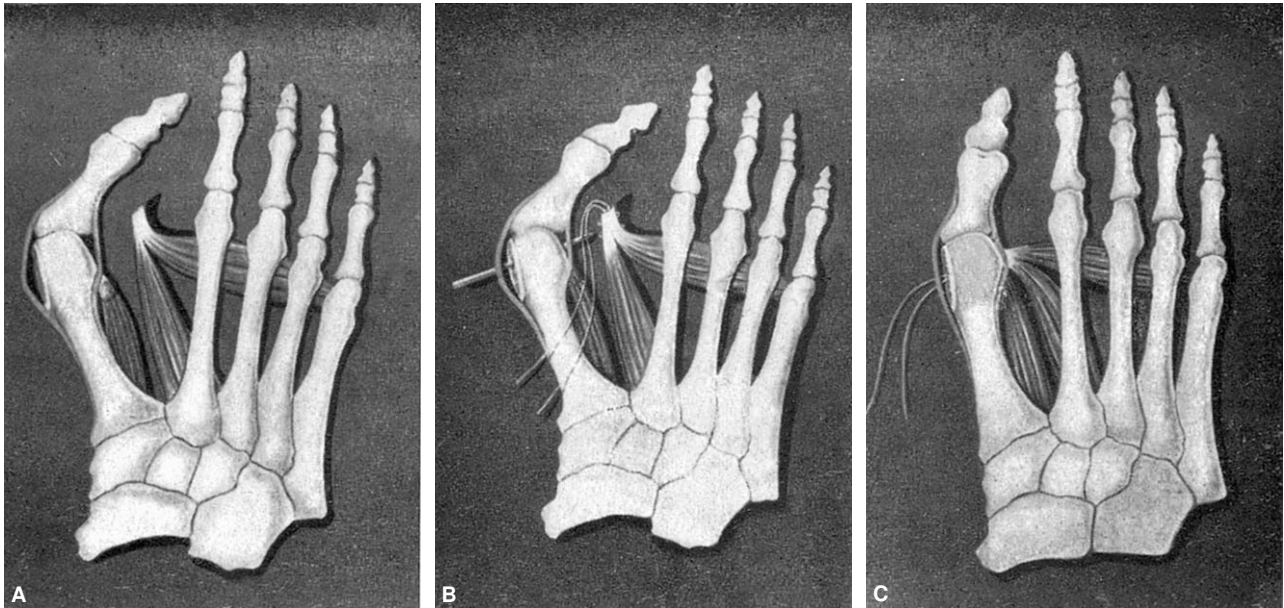


Fig. 1. Mac Bride's procedure as performed by the author. A) Detachment of the abductor hallucis tendon without excising the sesamoid. B) The first metatarsal head was perforated and a steel wire was passed through. C) Fixation of the tarsal tendon with moderate tension; a steel wire was passed. D) Fixation of the abductor tendon to the metatarsal head at moderate tension thanks to the transfixion point.

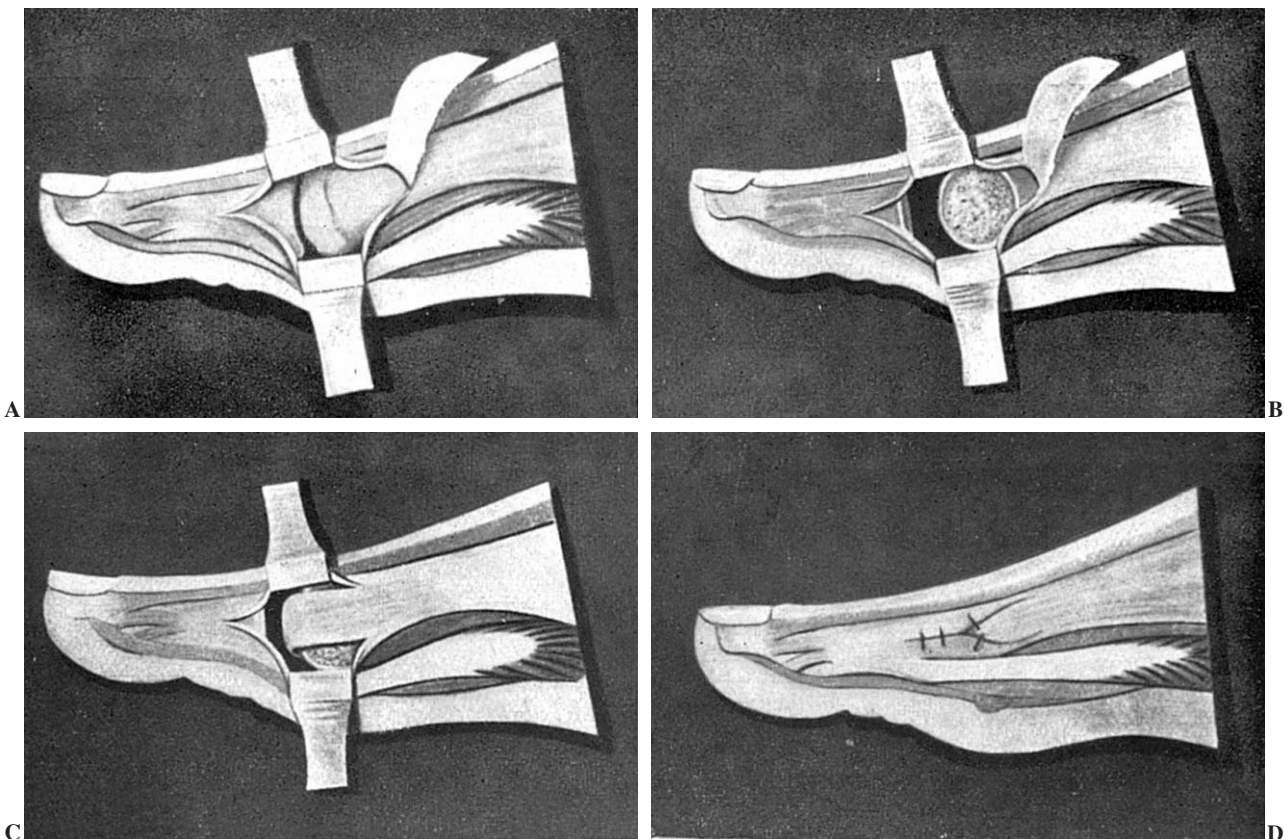


Fig. 2. Keller-Brandes procedure, seen from the toe's lateral aspect. A) Incision and elevation of the capsule flaps. B) Resection of the exostosis and of the phalangeal base. C) Interposition of a capsule flap. D) Capsule suture using the abductor hallucis muscle.

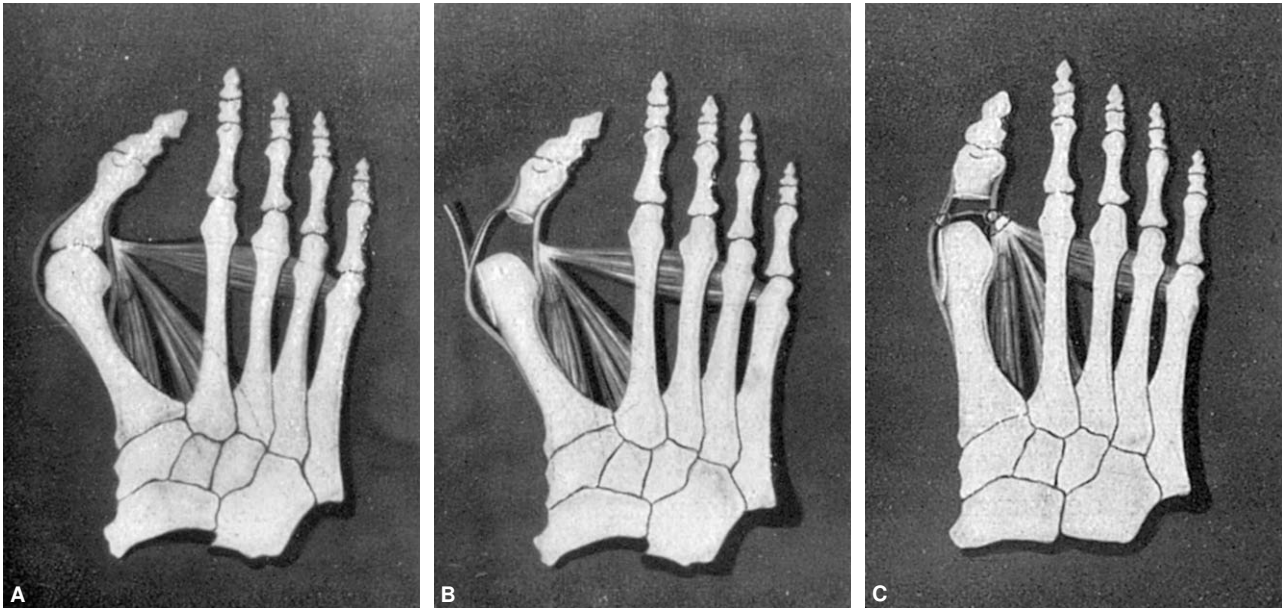


Fig. 3. Keller procedure, seen from the dorsal aspect: A) Previous situation. B) The phalanx was resected at its base and the exostosis removed. C) The abductor is tensed by the deep stitch that attaches the interposition flap.

the first and fifth metatarsals as close as possible. We find plaster useful for two reasons: it allows us to apply continuous traction during the first ten days and it allows the patient to start walking the next ten days but with his/her foot immobilized.

Post-operative care.- During the first few days the patient should be told to rest with his/her foot on a pillow at a height of about 30 cm or, even better, in a Brown splint. At three weeks, the plaster cast should be suppressed and physical therapy indicated. The patient should wear straight internal border shoes, preferably friar's sandals with adapted insoles.

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