



Joint Preserving Surgery in Severe Forefoot Disorders

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Review article

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Summary

Authors presents their experience with metatarsals osteotomies in severe forefoot disorders. The longitudinal decompression provided by the extra articular large and harmonized metatarsal shortening, focused on the ms point, allows to reach a new way in the correction of almost all forefoot deformities. This not only provides reliable and long term results, but also preserves the cosmetic appearance of the foot.

Key words: forefoot disorders, hallux valgus, claw toes, metatarsals osteotomies

As opposed to the “classic” surgical approach to the severe forefoot disorders, which combines in many cases a first metatarso phalangeal fusion and lesser metatarsal head resections, we propose a joint preserving surgery in almost all cases.

Few words on our personal experience. Before 1993, we already performed some metatarsal shortening, but not in very severe cases. In October 1993, we perform for the first time a very large shortening of the metatarsals. The result, exposed in the Figure 1, was such that we followed using this procedure, while studying the technique and its management.

In the two previous articles, we exposed this metatarsal shortening, and the main aspects of the techniques we use to correct these severe deformities: so that, in this paper, we expose above all the principles and the practical management we use in such severe forefoot disorders management, emphasizing one more time the illustrations.

METHOD, PRINCIPLES

More than 600 cases of this procedure have been performed since 1993

To reach such a joint preservation, the main principle is the **shortening osteotomies of all the metatarsals**:

- **on the first ray** usually we perform a *scarf* osteotomy. The primary correction is above all shortening, combined in most cases with lateral shift and other displacements as required.
- **On the lateral metatarsals** we perform a *Weil* osteotomy. The osteotomy is always modified by the addition of a second layer with removal of a thin trapezoidal section of bone. This is necessary both to avoid plantar translation of the metatarsal head, and to ensure the healing, since the shortening may reach the metatarsal on its shaft. Fixation is by either a twist off screw or by the 2.5 Barouk or FRS screw (Depuy).

Fig. 1. Our decisive case
In October 1993, We perform the joint preserving surgery in this case of severe forefoot disorders. In spite of dislocated MTP joints on all the rays, the correction with joint preserving remains 6 years after the surgery

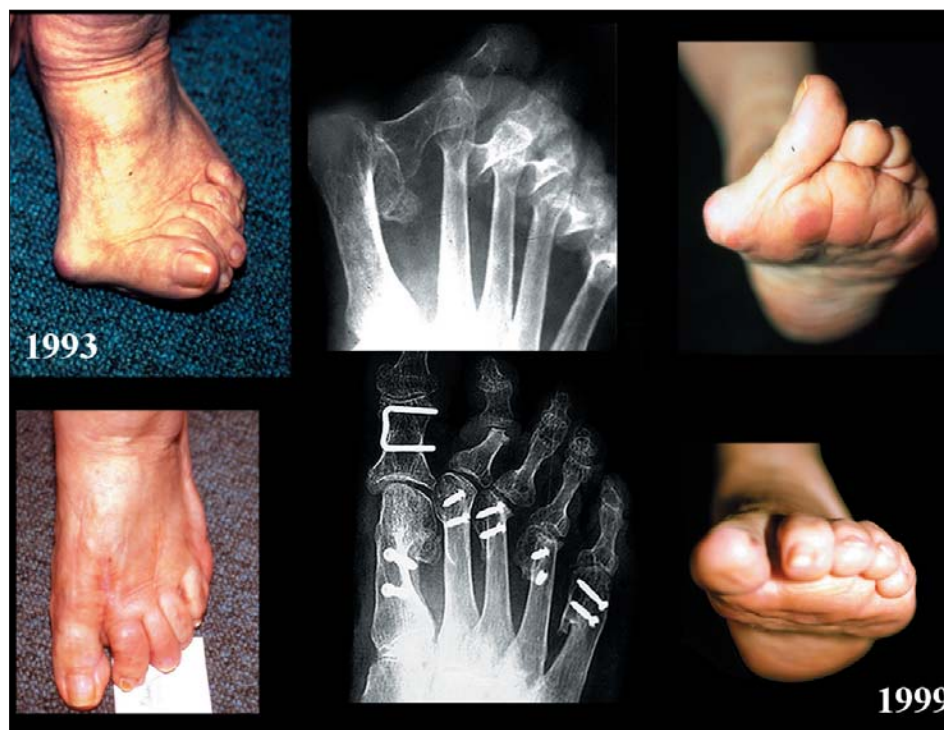
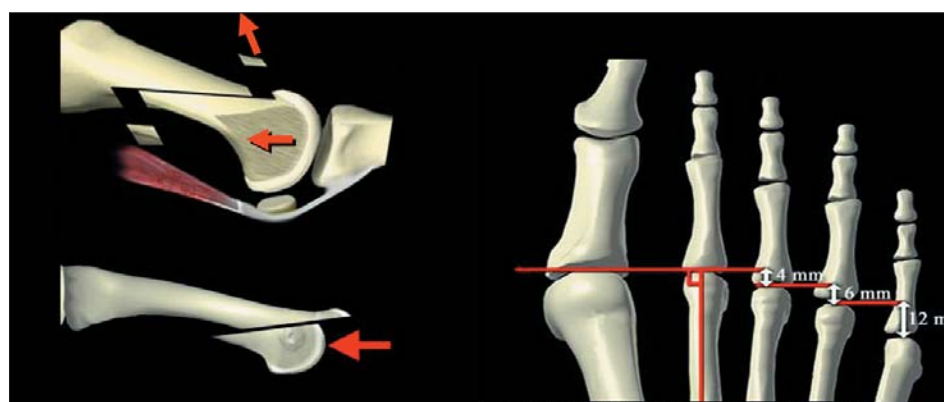


Fig. 2a. Metatarsal shortening.
a: The osteotomies
We use the scarf on the first ray, the Weil on the lateral rays, while respecting the metatarsal parabola



This metatarsal shortening must have the following features:

- 1) It has to be *large*.
- 2) It must be focused on the *metatarsal shortening point (ms point)*. This point is assessed on the most deformed ray; it is the radiographic projection, on the corresponding metatarsal, of the most proximal part of the base of the proximal phalanx ; This shortening may be slightly modified intra operatively, never less shortening, sometimes 2 to 3 mm more.
- 3) around this shortening the other metatarsals are shortened, to obtain a correct *metatarsal parabola*

Combined procedures (Fig. 3)

Hallux proximal phalangeal osteotomy is performed and fixed with dedicated staples.

On the **lateral rays** the techniques for claw toe correction and soft tissue surgery, BRT osteotomy are ex-

posed in the previous article (Lateral Rays). Similarly, for the first ray.

Gastrocnemius tightness

The gastrocnemius tightness increases or produces overload on the forefoot. The gastrocnemius release, notably the proximal one, decreases significantly the Forefoot overload, so this release must be performed in the same period that the foot local surgery, in order to ensure or improve the results. (see our book or web site).

On the Figure 4, we illustrate the preoperative assessment, then, on the Figure 5, the practical chronology of the operation.

PROBLEMS ENCOUNTERED

On the first ray. We expected some secondary impairment or recurrence of deformity after this joint preserving surgery: in fact, almost no cases of these drawbacks

Fig. 2b. Metatarsal shortening.
b: The ms point

Upper line: The **ms point** is located on the proximal part of the phalanx of the most deformed ray. Its projection on the corresponding metatarsal indicates the shortening to be done if we want a good and long lasting correction. One example on the first ray, another on the lateral rays

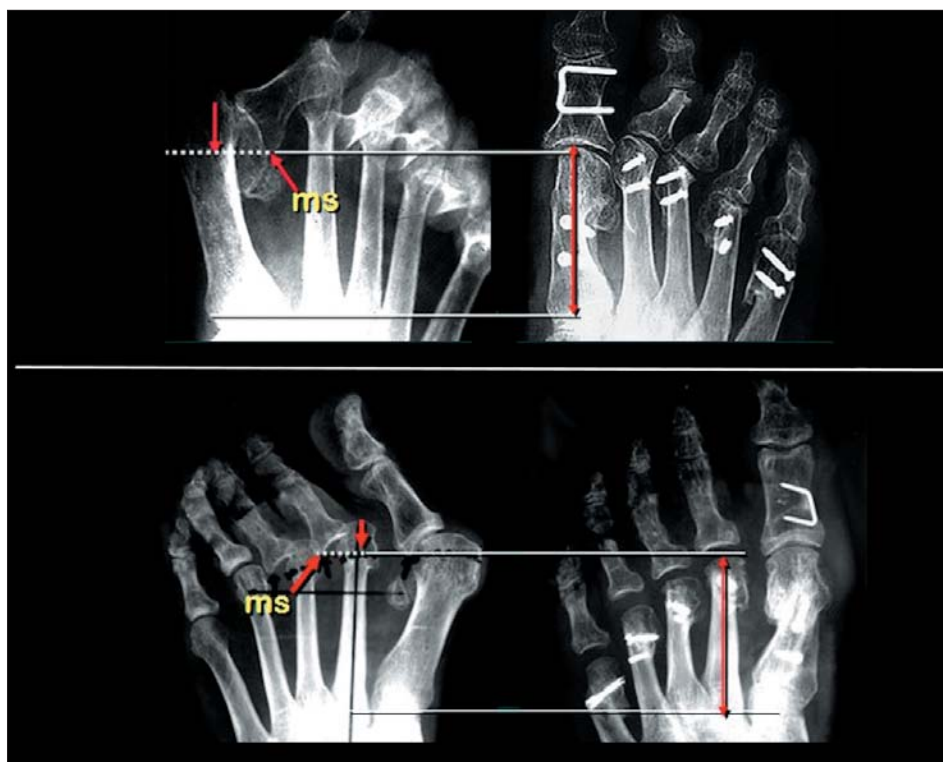


Fig. 2c. Metatarsal shortening.
c: Intra operative adjustment
It is only required in 10% of cases: **First ray:** we have to reach minimum 50° dorsal flexion. **Lateral rays:** correction of the MTP Dislocation without stiffness

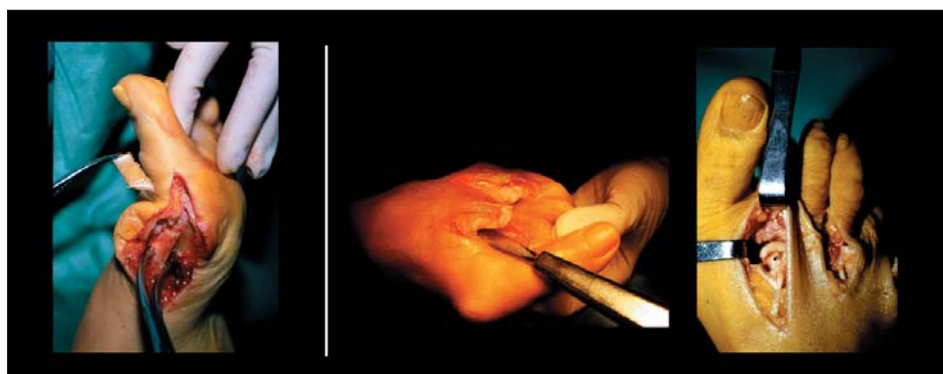


Fig. 3a. Combined procedures
Upper line. First ray: scarf shortening can be combined with many others displacements. Great toe proximal phalanx Osteotomy is combined in most cases

Middle and bottom lines: lateral rays. Weil shortening is always performed with a second layer. Local soft tissue procedures: tendons, MTP release. Claw toe local surgery, BRT osteotomy, gastrocnemius proximal release. (developed next figure)

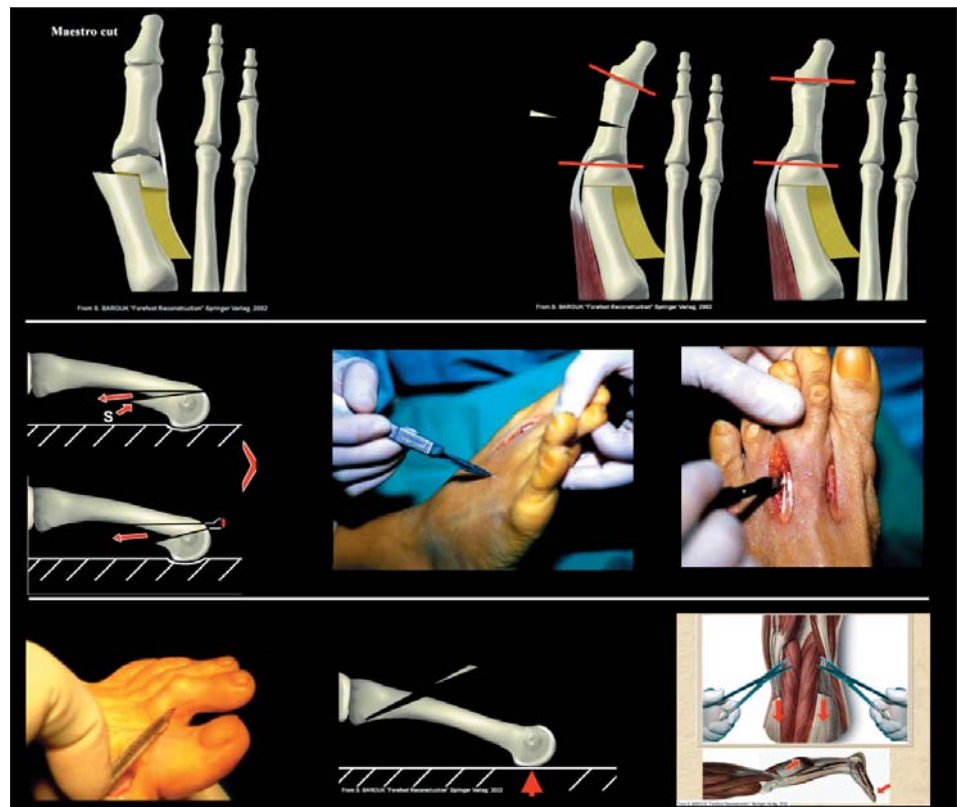


Fig. 3b. Combined procedures:
gastrocnemius release

In many case, like here (see the contracted toes), the local troubles are increased by overload on the forefoot due to gastrocnemius Tightness; so that the gastrocnemius proximal release is combined with the foot surgery, to ensure the result



Fig. 4. Pre-operative assessment

Upper : clinically: dorsal flexion is really assessed with this handle. Loss of MTP plantar flexion on lateral rays; assessment of metatarsalgia.

Bottom: X Rays. The dorsal plantar view is obligatory, but may not be sufficient; Medial oblique view may be required

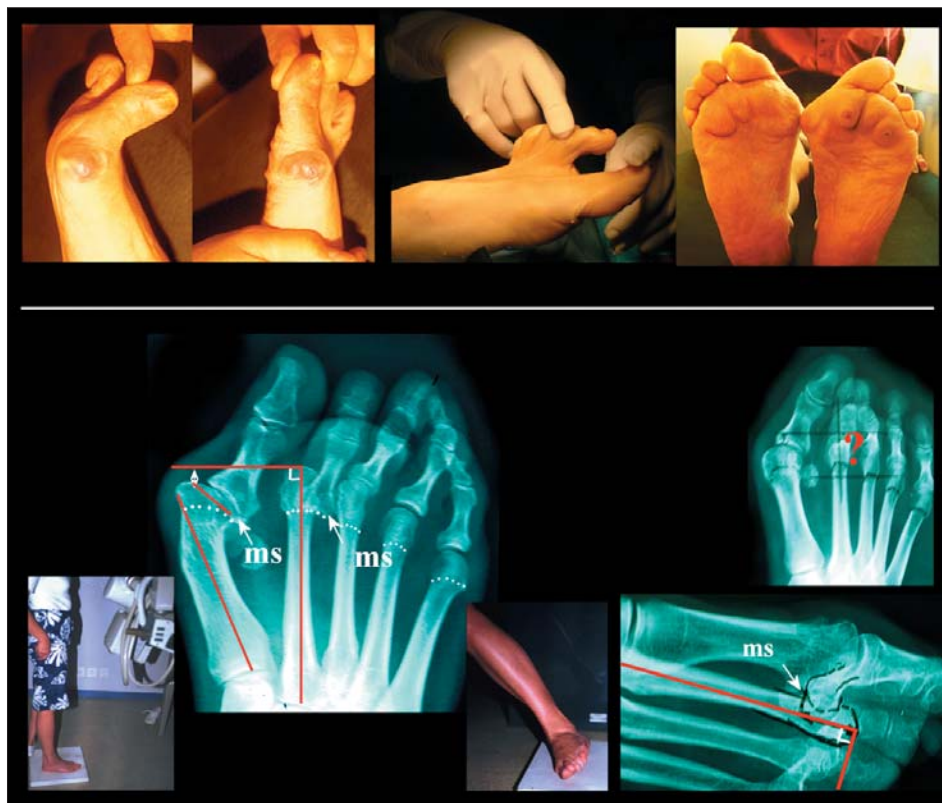


Fig. 5a. Intraoperative successive steps: First steps. We begin by first MTP lateral release, with sometimes entire cut of the abductor tendon; then Weil osteotomy on lateral rays. the metatarsal head has to be free, to adapt its proximal sliding;; MTP dislocation has to be corrected without tension

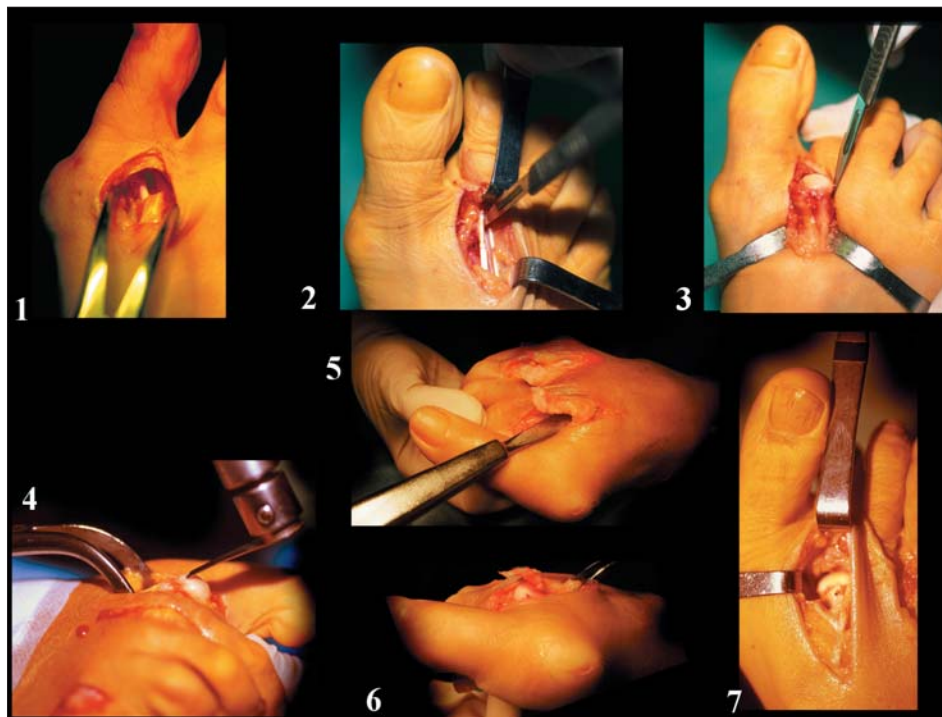


Fig. 5b. Intraoperative successive steps: Second layer for Weil Osteotomy.

- The shortening is such that we have to reach the shaft, so that the second layer is obligatory
- The distal metatarsal resection, and its control to have a correct metatarsal parabola

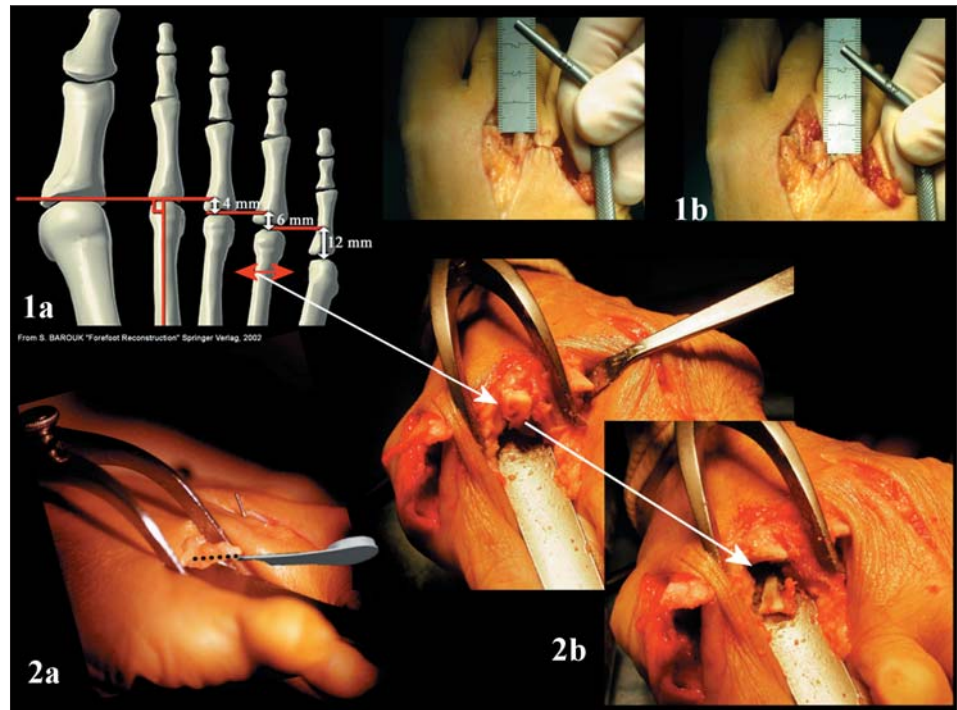


Fig. 5c. Intraoperative successive steps: adaptation of the correct length of the first metatarsal, by scarf: Temporary K wiring fixation and X-rays control as far as the two first metatarsals are with the same length Then fixation of all the osteotomies

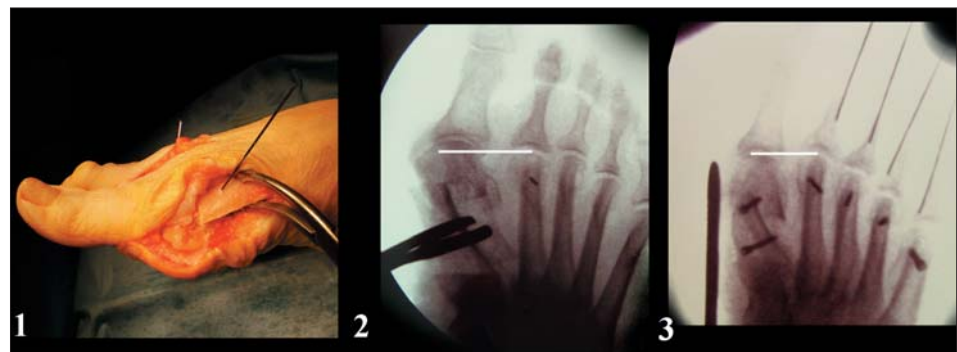
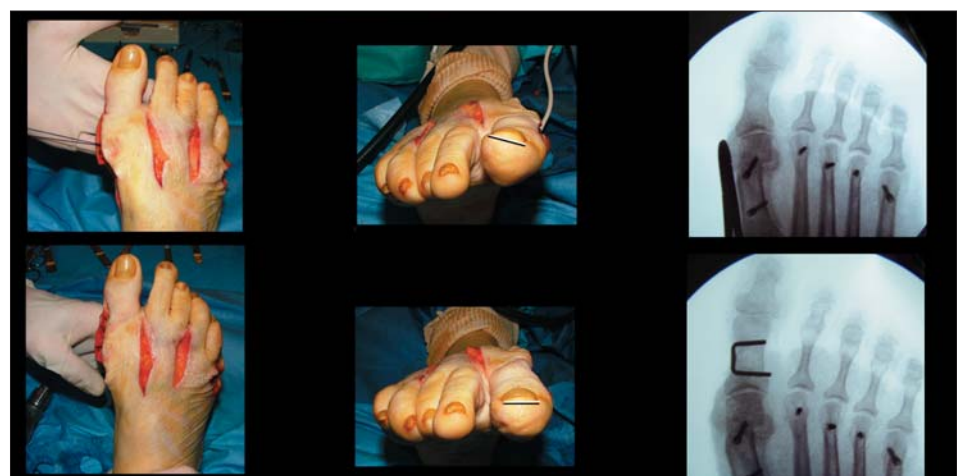


Fig. 5d. Intraoperative successive steps: great toe proximal phalanx osteotomy, varisation - derotation with the dedicated "12" memory staple



There were observed. Ex: in Rheumatoid forefoot, only 2% of secondary MTP fusion

On the lateral rays. Weil osteotomy, similarly, does not provide MTP stiffness, because of the very large shortening required. Nevertheless, when this occurs, mini invasive MTP release is a good solution. Recurrence of metatarsalgia is treated by BRT Osteotomy. No recurrence of MTP dislocation, similarly because of the large and harmonized metatarsal shortening, and above all the respect of the ms point for shortening

INDICATIONS AND RESULTS

The current follow up is now sufficient (2 to 15 years, average 6.5 years), to assess these results and to determine the place of such joint preserving surgery in severe forefoot deformities. Good Results are observed in almost all cases.

Indications

Almost all cases of Severe Forefoot disorders may have a reliable and long lasting correction with Joint preservation. Advanced hallux valgus, MTP dislocations, iatro-

Fig. 5e. Intraoperative successive steps: summary

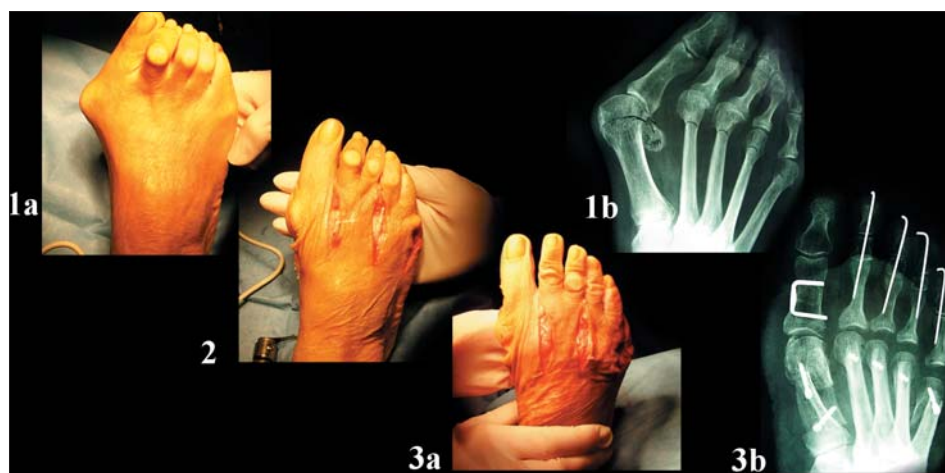


Fig. 6. Drawbacks

Almost all cases of insufficient results or drawbacks are due to insufficient metatarsal shortening and no respect of the ms point. In this case, the ms point indicated that the remaining length of the metatarsal had to be 60 mm: in fact, the remaining length was 70 mm, so that the shortening was insufficient, the ms point was not respected, and the result was bad



Fig. 7. Cases of no joint preserving.

When the MTP joint or the metatarsal heads are too much impaired, their preservation is not possible. However we remark that the lesions have to be very advanced, much more than in usual indications of no joint preserving



genic disorders, and at last rheumatoid forefoot, even with impaired MTP joints and metatarsal heads

Nevertheless, some cases of very severe forefoot disorders are still an indication of no joint preserving surgery, as showed in the Figure 7. However, 2 points have to be taken into account: 1 we speak about *impairment* and not about *deformation*, because the joint preservation is almost possible whatever the deformation. 2. the joint preserving is possible much more far than surgeon usually believe.

CONCLUSION

The longitudinal decompression provided by the extra articular large and harmonized metatarsal shortening, focused on the ms point, allows to reach a new way in the correction of almost all cases of severe forefoot disorders. This not only provides reliable and long term results, but also preserves the cosmetic appearance, which is important since we deal with a majority of females.

Fig. 8a. Indications: a. Advanced hallux valgus deformity
Note that the good result, one more time, is in relation with the respect of the ms point, as well as for all cases

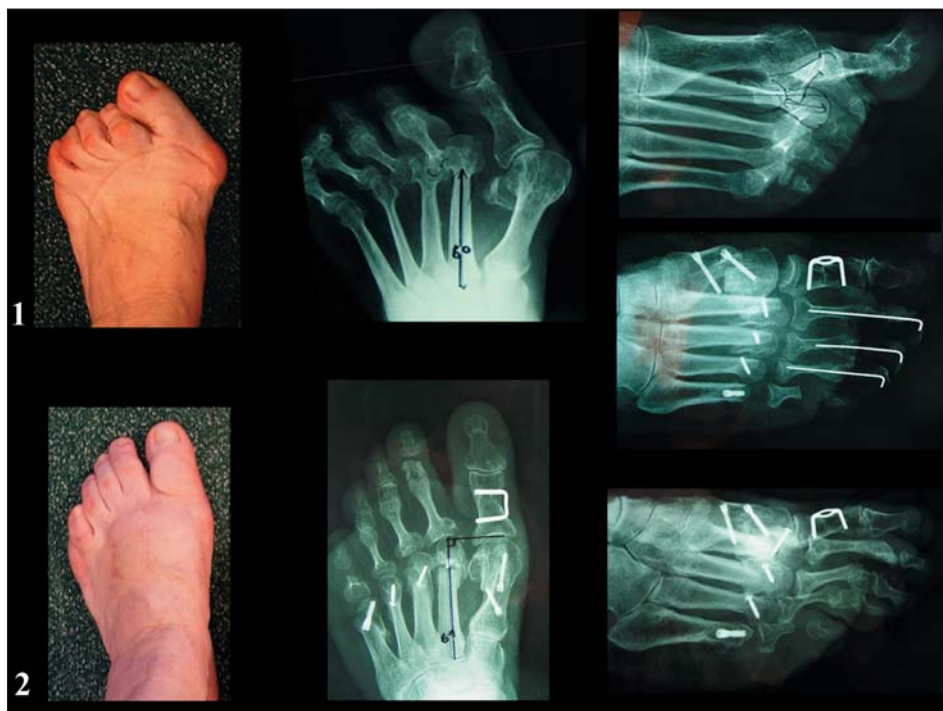


Fig. 8b. Indications: b. Iatrogenic deformities
Whatever the grade and the origin of the deformation, Joint preserving is almost always possible

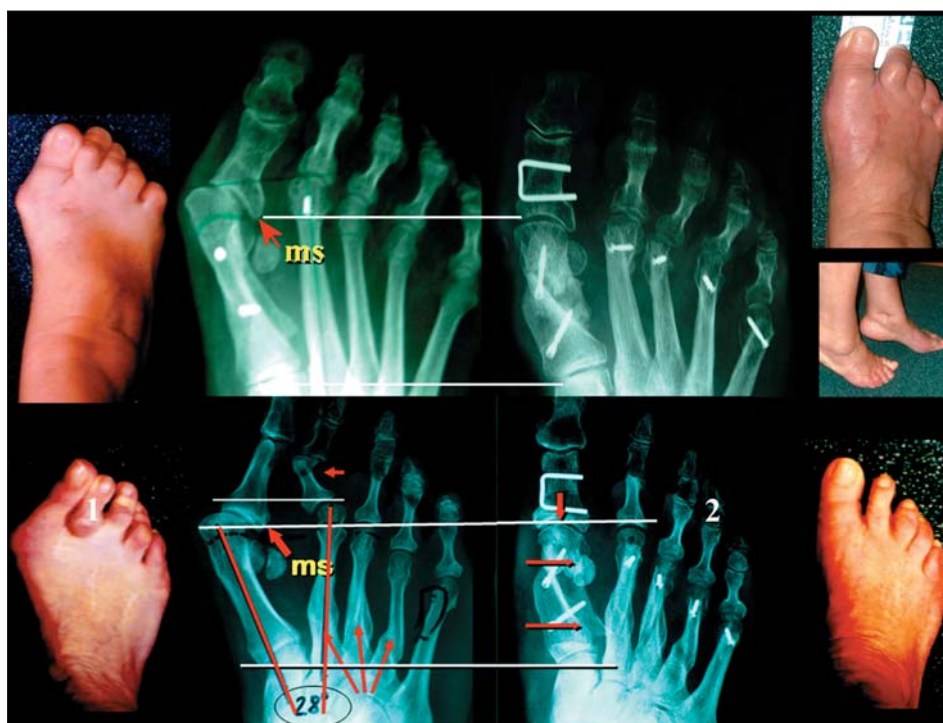
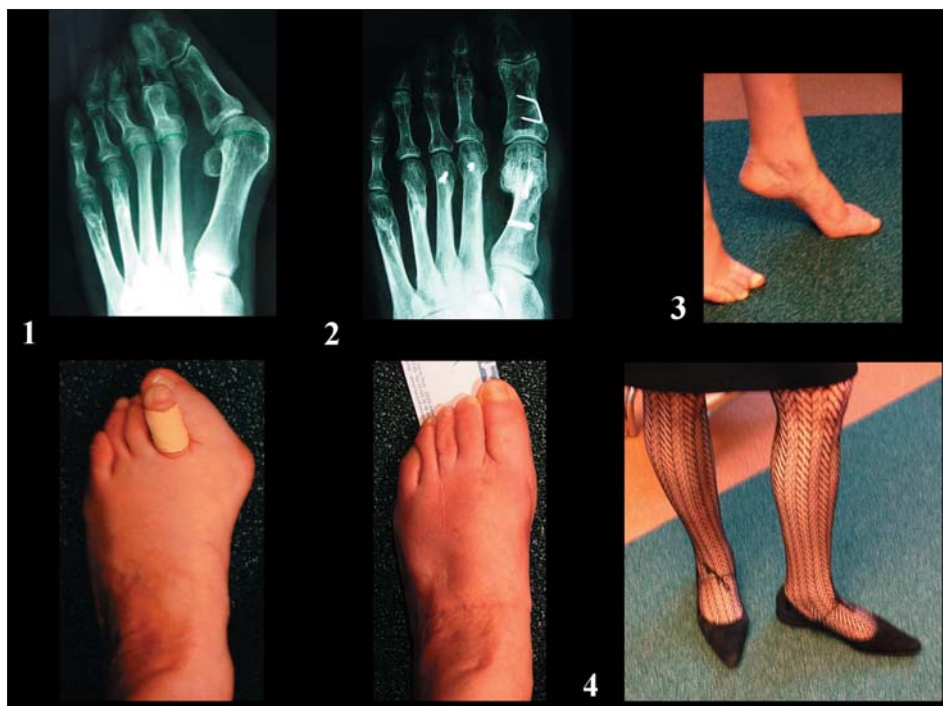


Fig. 8c. Indications: a. Rheumatoid forefoot

This is the best example of joint preservation, in spite of very deformed or even impaired rays .average of Joint preserving rays: 85%



Fig. 9. Joint preserving makes elegant feet and allows elegant footwear, notably because of the preservation of the toes length. The cosmetic aspect has to be taken into account and respected



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