

Brachymetatarsia

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Introduction

- Brachymetatarsia – a rare clinical entity characterized by abnormally short metatarsals
- Fourth metatarsal – is the most commonly affected
- Strong female prevalence (25:1)*

Etiology

- Idiopathic - early closure of epiphyseal plate, most common
- Associated with other conditions such as Albright's Syndrome , Down's Syndrome , parathyroid alterations
- Acquired - early closure of epiphyseal plate after trauma or infection

Physiology

- Brachymetatarsia interrupts normal weight distribution on mid and forefoot
- Adjacent rays loaded excessively – pain and plantar callosities develop
- Short toes tends to drift upward, causing footwear problems
- Hallux valgus may develop

Clinical presentation

- Cosmetic - “cocked-up” toe deformity
- Metatarsalgia , shoe wear problems
- Usually not apparent at birth , become visually obvious at 4 to 15 years of age with closure of growth plates

Treatment

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graph TD; Treatment[Treatment] --- Conservative[Conservative]; Treatment --- Surgical[Surgical];
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Conservative

Surgical

Conservative

- Simple padding or deeper shoes to accommodate the toe
- Shoe with large toe box
- Insoles to relieve plantar pressure

A case presentation of the rare condition
Brachymetatarsia
Pete Burbidge, Senior Podiatrist Northern Trust

Operative

- Gradual lengthening by callostasis
- One stage lengthening with intercalary bone graft

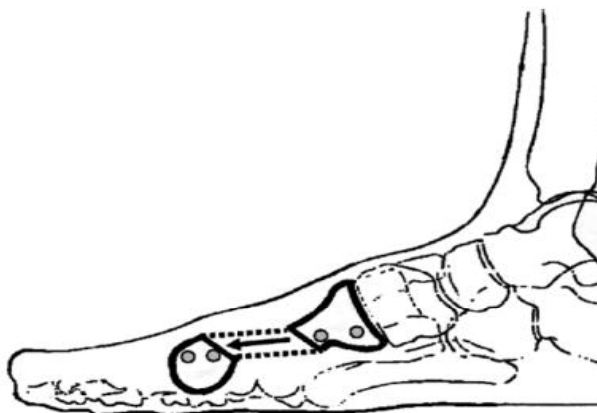
J Pediatr Orthop. 2006 Mar-Apr;26(2):250-4.

Treatment of brachymetatarsia by distraction osteogenesis.

Shim JS, Park SJ.

Department of Orthopedic Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul,

- 17 brachymetatarsia patients with 39 short metatarsal bones
- Mean lengthening fourth metatarsal +17.1 mm (36.2%)



Comparison of the Outcomes of Distraction Osteogenesis for First and Fourth Brachymetatarsia

By Keun-Bae Lee, MD, PhD, Hyeong-Won Park, MD, Jae-Yoon Chung, MD, PhD, Eun-Sun Moon, MD, PhD, Sung-Tack Jung, MD, PhD, and Jong-Keun Seon, MD, PhD

- 46 patients (64 feet, 74 Metatarsals)
- 42 fourth brachymetatarsia in 29 patients
- Follow up 56.1 months

Results:

- All patients satisfied with the final length of metatarsal
- The mean lengthening gain 16.3 mm

The treatment of congenital brachymetatarsia by one-stage lengthening.

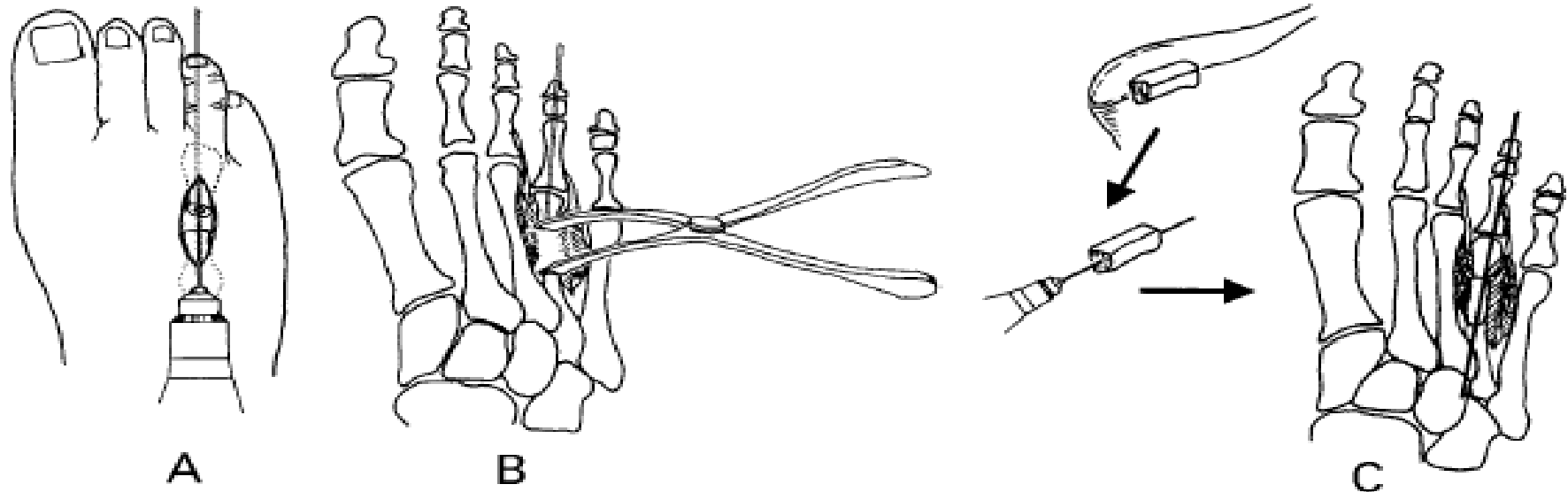
Baek GH, Chung MS.

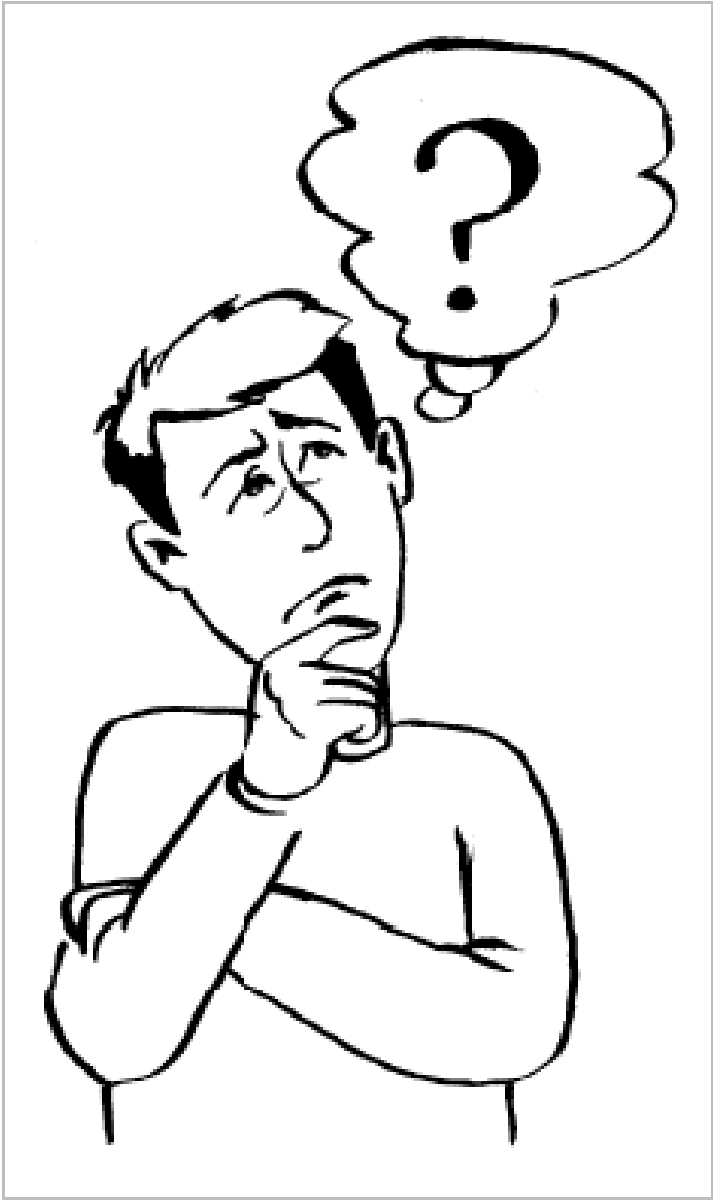
Department of Orthopaedic Surgery, Seoul National University College of Medicine, Korea.

One-stage lengthening using intercalary autogenous bone graft in 34 metatarsals (21 patients).

Mean follow up of 2.1 years.

Average length gain 14 mm (32%)





Case presentation

- 16 year old female
- Short 4th toe bilaterally
- Pain during walking
- Otherwise healthy

Clinical pictures

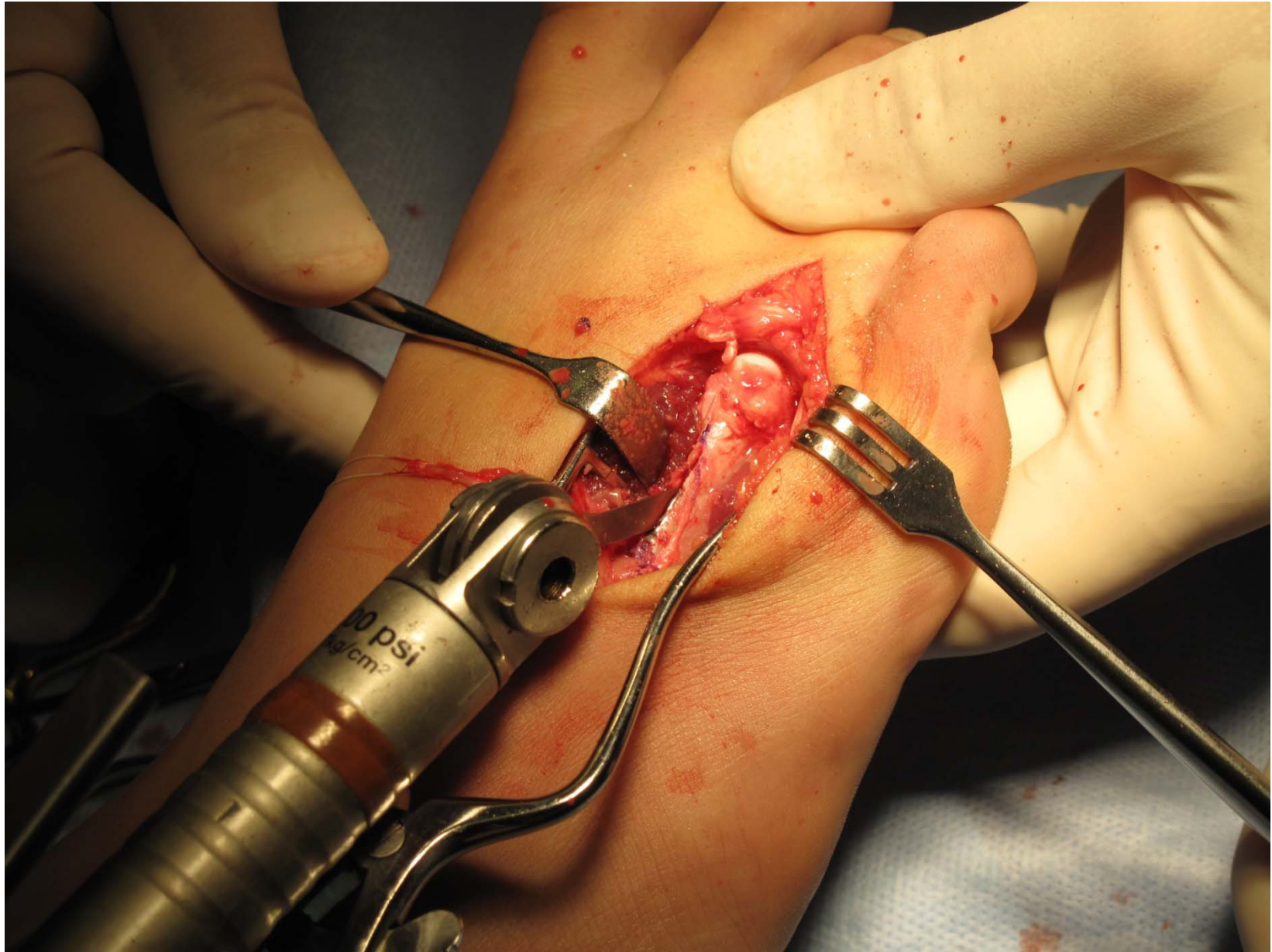


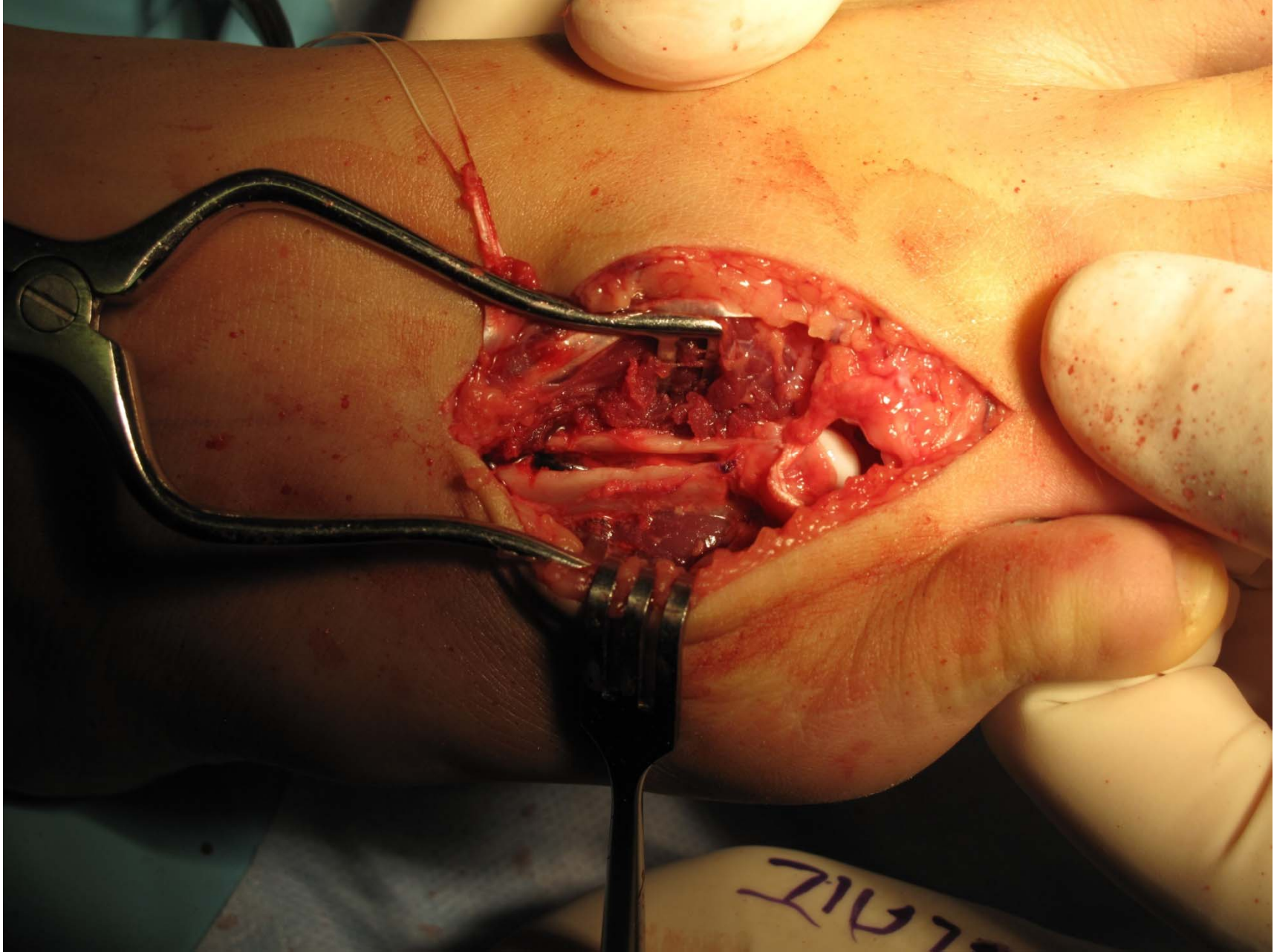
Preoperative X-Rays



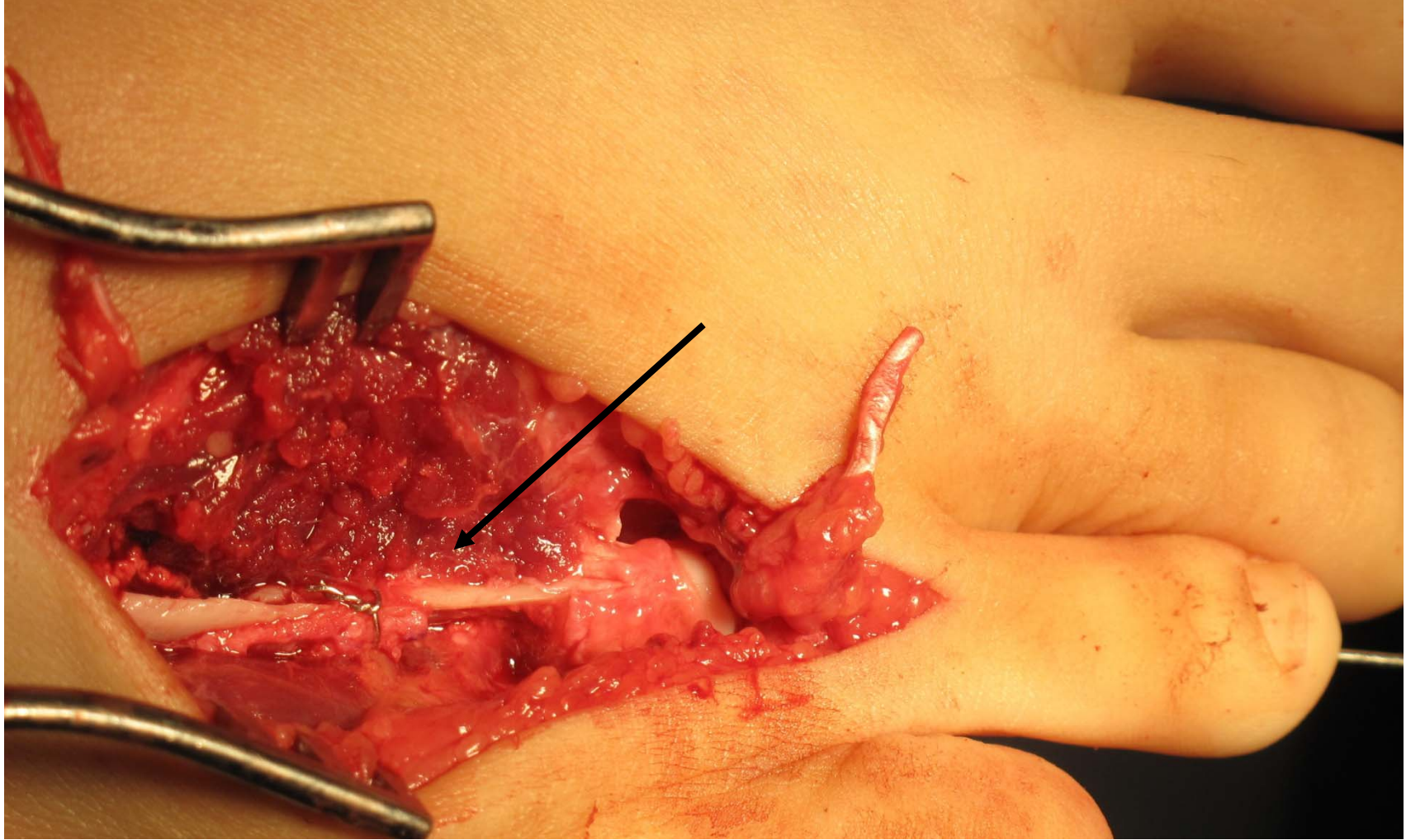


















Postoperative X-rays



Postoperative X-rays



Postoperative X-rays



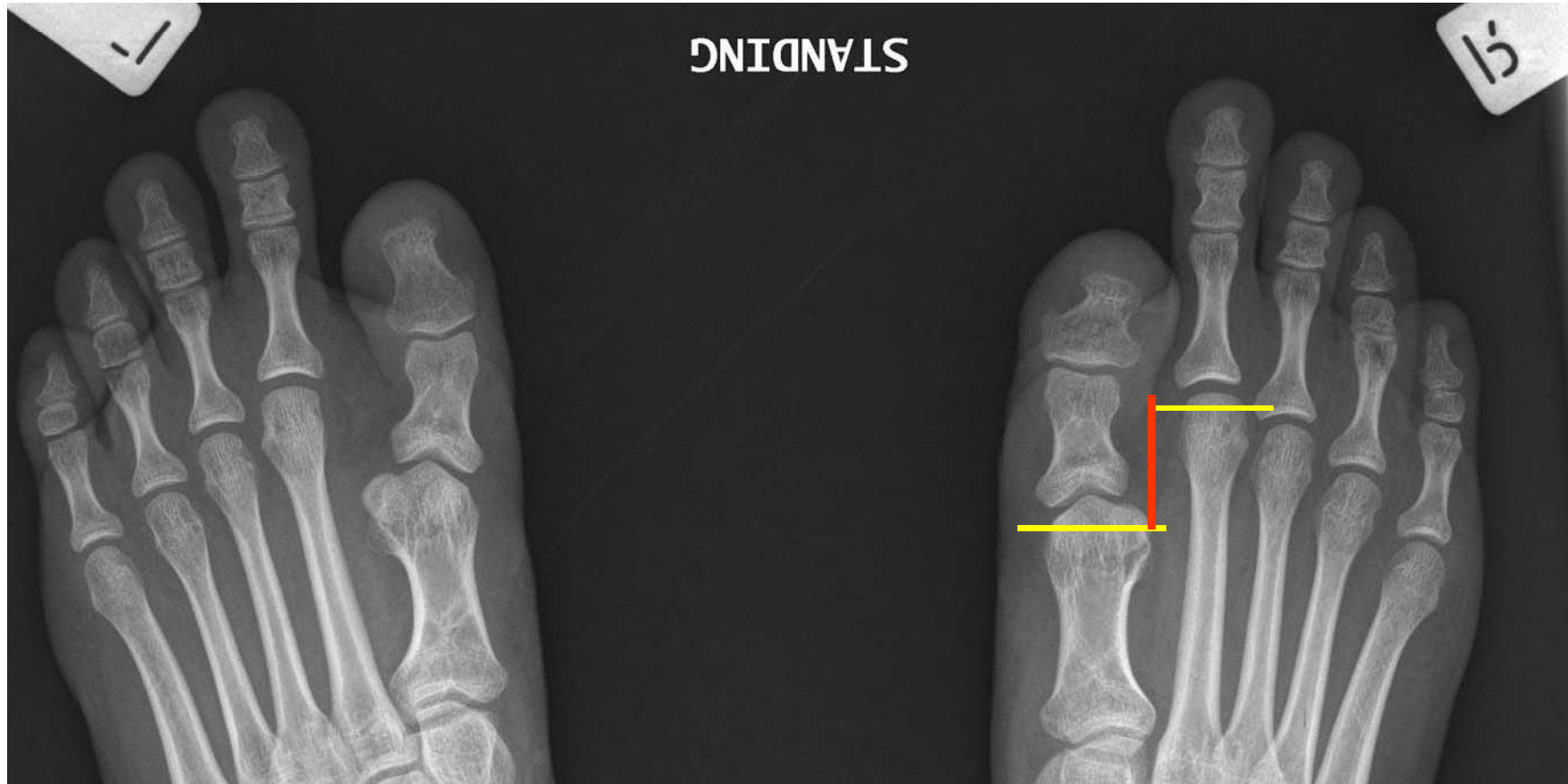
Case presentation 2

- 20 years old female
- Bilateral congenital short 1st metatarsal
- Pain during walking
- Otherwise healthy

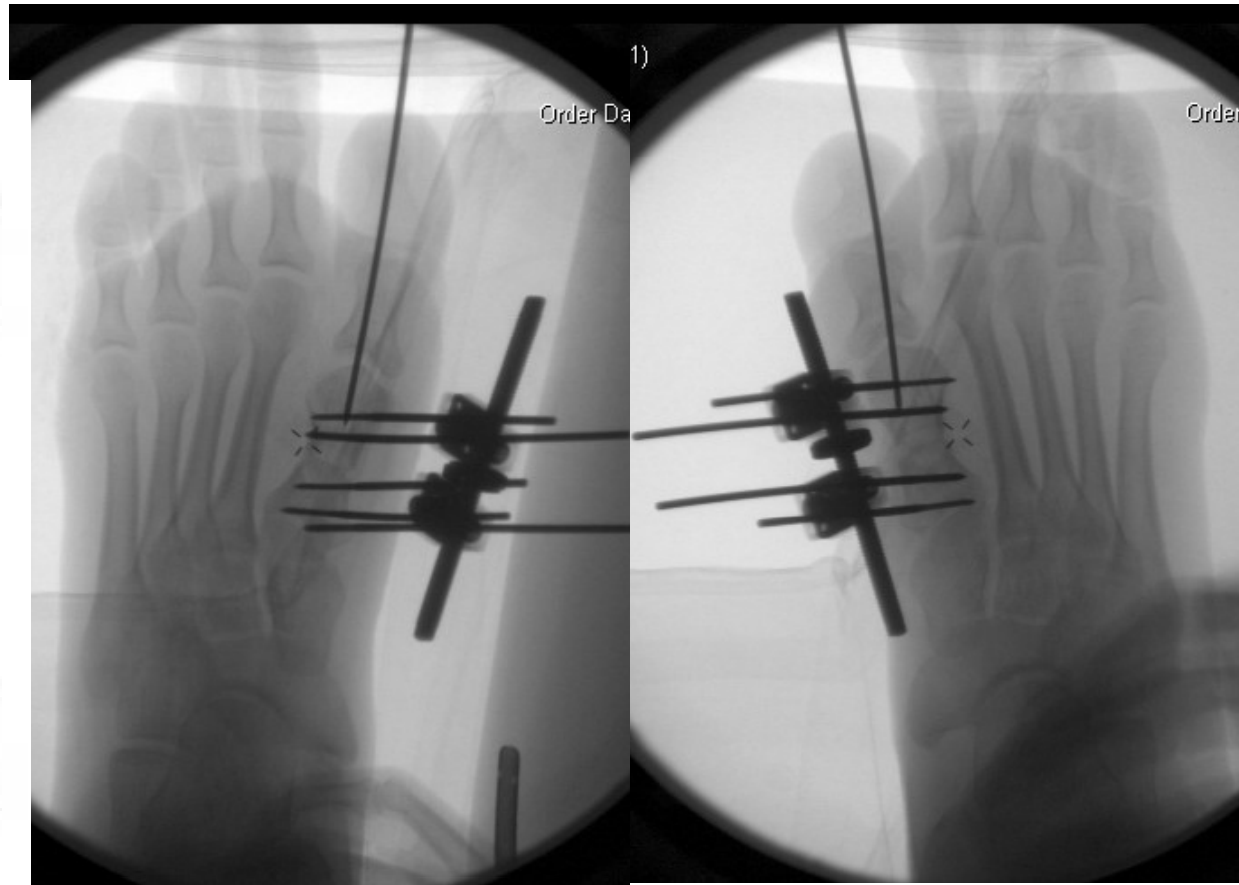
Preoperative X-rays:



Preoperative X-rays:



Intraoperative fluoroscopy



2 weeks post op



4 month: Delayed union on right -BMP injection



8 Month: Resection arthroplasty of PIP (shortening of 2,3 toes bilaterally)



12 month after elongation



Clinical picture



Results

- During 2 years follow up union was achieved in all lengthened metatarsi.
- In the 1st metatarsi injection of bone marrow was necessary to expedite a delay in union in one side.
- Due to insufficient length, shortening of the 2nd and 3rd toes was added.
- There were no major complications.
- At last follow up, patient had a normal, pain free gait.

Conclusion

- The surgical solution is safe and effective.
- Little to worry about over lengthening of neurovascular bundle.
- As usually the deformity corrected of the second decade of life.



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