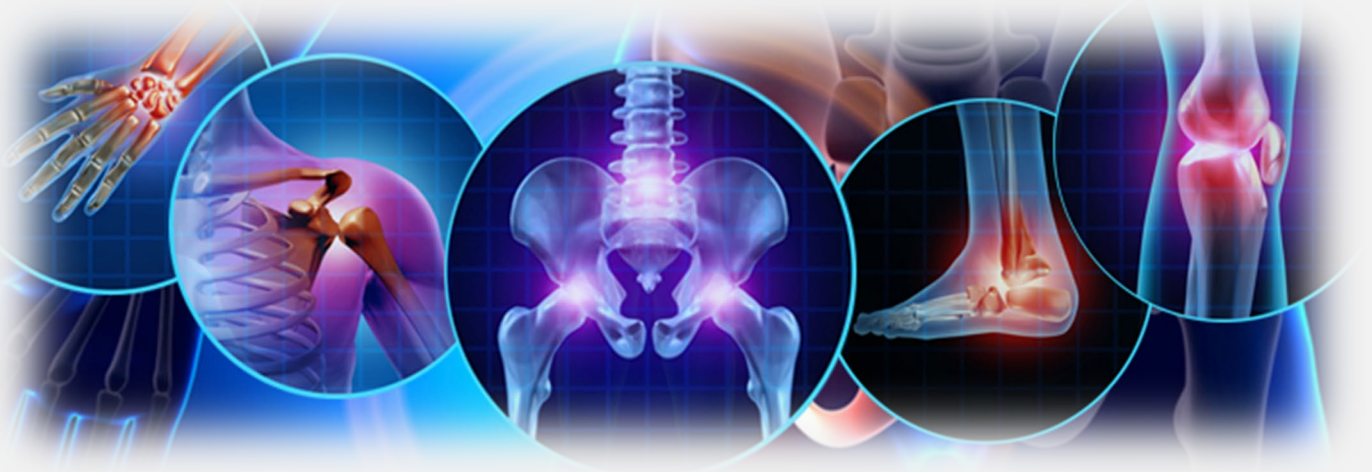




ORTHO NEWSCAST



Vol1|Issue 12|2020

Dear Doctor,
Greetings from Micro Labs. We are happy to bring you "Ortho Newscast" which contains latest and interesting news in the field of Orthopaedics.

This issue contains

- Effect of osteoporosis on healing of subcapital humerus and distal radius fractures.
- Joint-Preserving Surgery for Hyperextension Deformity in Rheumatoid arthritis- A case report.

A novel Magnetic Tracking System for Flexible Surgical Robots Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

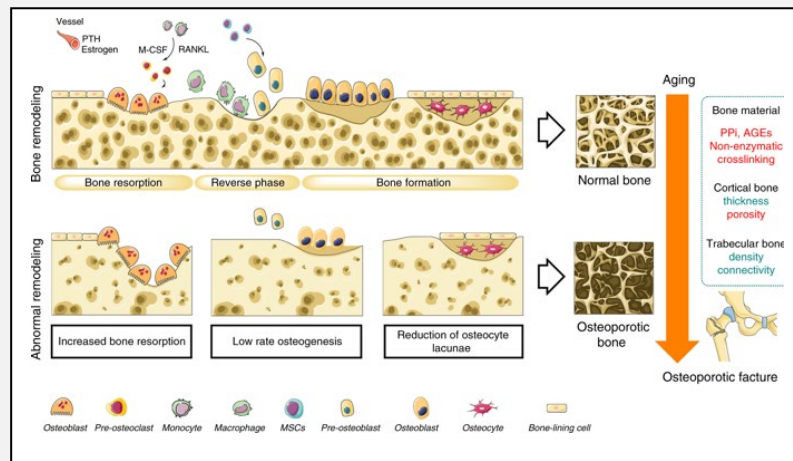
Best Regards,
Medical Team,
Micro Labs Limited



Effect of osteoporosis on healing of subcapital humerus and distal radius fractures.

Osteoporosis increases bone fragility and fracture risk. Most common osteoporotic fractures are of distal forearm and the proximal humerus, besides vertebral and hip fractures.

Although the failure rate of implant fixation is increased in patients with osteoporosis, these patients had no clearly increased risk of delayed union or non-union.



More clinical evidence is available on the effect of osteoporosis treatment on fracture healing.

Aim of this study was to investigate if osteoporosis is associated with more fracture non-unions in patients with a proximal humerus or distal radius fracture compared to patients without osteoporosis.

Methods:

A retrospective cohort study involving 500 Patients.

Patients were included if a DEXA-scan had been made within a year after the fracture.

Patients with severe injuries (injury severity score ≥ 16), patients using osteoporosis treatment at the time of the fracture, and patients who went elsewhere for treatment/follow-up or were lost to follow-up, were excluded from the analysis.

Osteoporosis was diagnosed based on the standardized (T) scores used in the WHO criteria that define osteoporosis as a BMD T score ≤ -2.5 SD.

A secondary analysis was performed in which osteoporosis was defined as a BMD T score ≤ -2.5 SD or between -2.5 SD and -1.0 SD in combination with a proximal humerus fracture.



Results:

Osteoporosis was diagnosed in 29 % of patients.

A total of 490 fractures (distal radius n=350 and proximal humerus n = 140) were treated. Radiological delayed- or non-union was described in 2 % of cases , all proximal humerus fractures of which 1.3% were clinically manifested.

All fractures	Fracture union	Delayed or non-union	p-value
Osteoporosis (T-score < -2.5SD), n (%)	132 (29.3)	5 (45.5)	0.27
Osteoporosis (T score ≤ -2.5 SD or between -2.5SD and -1.0SD in combination with a proximal humerus fracture), n (%)	204 (45.3)	10 (90.9)	0.003
Subcapital humerus fractures	Fracture union	Delayed or non-union (n = 11)	p-value
Osteoporosis (T-score < -2.5SD), n (%)	44 (31.7)	5 (45.5)	0.36
Osteoporosis (T score ≤ -1.0SD), n (%)	115 (82.7)	10 (90.9)	0.45

The incidence of delayed- or non-union in fracture treatment did not differ between patients with osteoporosis and the patients without osteoporosis (p = 0.27).

In the second analysis a significantly higher incidence was found in patients with osteoporosis (10/214 fractures vs 1/247 fractures p = 0.003).

Discussion:

Mechanical and biological factors that are involved in the complex process of fracture healing seem to be affected negatively by osteoporosis.

Studies have shown that reduced bone mass and mechanical strength of the bone after completion of healing and fracture healing appeared to be delayed.

Progenitor cell recruitment, differentiation, and proliferation during the early phase of fracture healing were found to be impaired in the presence of postmenopausal osteoporosis, as were the angiogenesis and vasculogenesis during the early to mid-phase of fracture healing, the capacity of extracellular matrix production and callus formation during the midphase, and finally the capacity of callus remodelling in the later phase of fracture healing.

Conclusion:

Osteoporosis does not significantly influence the progress of fracture healing in distal radius and proximal humerus fractures.

Reference:

Gorter EA et al. Does osteoporosis affect the healing of sub capital humerus and distal radius fractures? .Journal of Orthopaedics. 2020; 22: 237-241.



Joint-Preserving Surgery for Hyperextension Deformity in Rheumatoid arthritis- A case report.

Interphalangeal hyperextension is major hallux deformities in patients with rheumatoid arthritis; however, there is yet no established surgical method for this deformity .

Current is case of rheumatoid arthritis who developed hallux interphalangeal hyperextension and painful callosity on the plantar hallux accompanied by limited dorsiflexion at the metatarsophalangeal joint.

Case presentation:

The patient was a 64-year-old female with a 40-year history of seropositive RA. After 38 years of treatment with conventional disease-modifying antirheumatic drugs, her RA disease activity had been well controlled in a state of low disease activity or remission since the introduction of abatacept 500mg every 4 weeks in combination with methotrexate 4 mg/week and prednisolone 2 mg/day for 3 years.

Patient had previously undergone an arthroplasty in her left radioulnar joint but had no prior surgeries in her foot.

She complained of gait disturbance due to a painful callosity in the plantar hallux. The pain of the callosity increased even with conservative treatment with insole use in the past 10 years, and was referred for surgical treatment.

Right foot showed severe hindfoot valgus, rocker bottom deformity, and hyperextension of the hallux IP joint in the standing position.

Medial forefoot had ground contact not at the first metatarsal head but at the hallux IP joint, which corresponded to the location of the painful callosity.

The range of motion at the metatarsophalangeal (MTP) joint was limited to 0° in dorsiflexion and 40° in plantar flexion. She was unable to flex the hallux IP joint actively, suggesting the ruptured or elongated flexor hallucis longus tendon.

AP weight-bearing foot radiograph showed hallux valgus deformity and no clear space at the first MTP joint, but the configuration of the metatarsal head and proximal phalanx was preserved.

Treatment options were discussed with the patient. Patient rejected our recommendation to perform triplearthrodesis for reconstructing the mid- and hindfoot deformities because of the need for prolonged nonweight bearing during the postoperative course.

Patient hoped to undergo a surgery restricted to the forefoot, which would allow her to ambulate with the heel immediately postoperatively.

Surgery was performed that involved correcting the sagittal alignment of the hallux in order to relieve the plantar pressure at the IP joint.

Surgery: in the supine position a thigh tourniquet was applied. A 2cm dorsal longitudinal incision was made over the medial cuneiform between the extensor hallucis longus and extensor hallucis brevis tendons, and a linear capsulotomy was made to expose the underlying medial cuneiform.

10° of opening wedge osteotomy was applied to the medial cuneiform using a lamina spreader as an opener to an extent that the spreader did not crush the bone, and about 10° of opening was achieved.

Fixing of the osteotomy site was done using a dorsal locking plate after filling the gap with granulated β -tricalcium phosphate.

Then a dorsal longitudinal incision was made at the first MTP joint. A capsular incision was then made in a longitudinal orientation a few millimeters laterally away along the medial edge of the extensor hallucis longus tendon.

After the dorsal, medial, and lateral capsules and collateral ligaments were released, the adhesions of the plantar plate were released using the McGlamry elevator. A distal oblique osteotomy was performed at the metatarsal head in a direction from the dorsal-distal to the plantar-proximal aspect with an angle of 45° to the metatarsal shaft.

Metatarsal head was pushed backward by 1 cm and laterally by 5mm. After a provisional fixation of the osteotomy site with a Kirschner wire, the lid of the instrument

set was placed on the sole of the foot to simulate weight-bearing.

Then, It was confirmed that the area of the sole underneath the first metatarsal head touched the lid and the dorsiflexion at the MTP joint increased up to 50°. The metatarsal head was fixed with a headless compression screw, and the dorsal prominent bone of the proximal fragment was excised.

As the tension of the extensor hallucis longus was tight, the tendon was cut at the attachment site on the distal phalanx, folded back, and sutured to itself after penetrating through the distal part of the dorsal capsule.



Post op X rays

In Addition, Weil osteotomies for the second and third metatarsals and percutaneous flexor digitorum longus tenotomy at the plantar distal IP joint of the fourth and fifth toes were performed for coexisting lesser toe deformities.

Patient was allowed to bear weight on the heel on the next day after the surgery by using a heel weight-bearing shoe, and foot-flat gait was permitted at 3 weeks postoperatively.

Patient achieved ambulation, including the toe push-off phase, in a normal shoe, was allowed at 10 weeks after the surgery when bone union at all osteotomy.

Discussion:

Major hallux deformities in patients with RA are hallux valgus, hallux rigidus, and IP hyperextension.

Arthrodesis of the IP joint in a situation of limited MTP joint motion would be troublesome even after a successful bone union, as it would interfere with the toe-off phase of gait or with shoe wearing.

Plantar flexion opening wedge medial cuneiform osteotomy, known as the Cotton osteotomy, is an effective procedure to lower an elevated first metatarsal and has an advantage of adjusting the degree of plantar flexion according to the size of the opened wedge.

Conclusion:

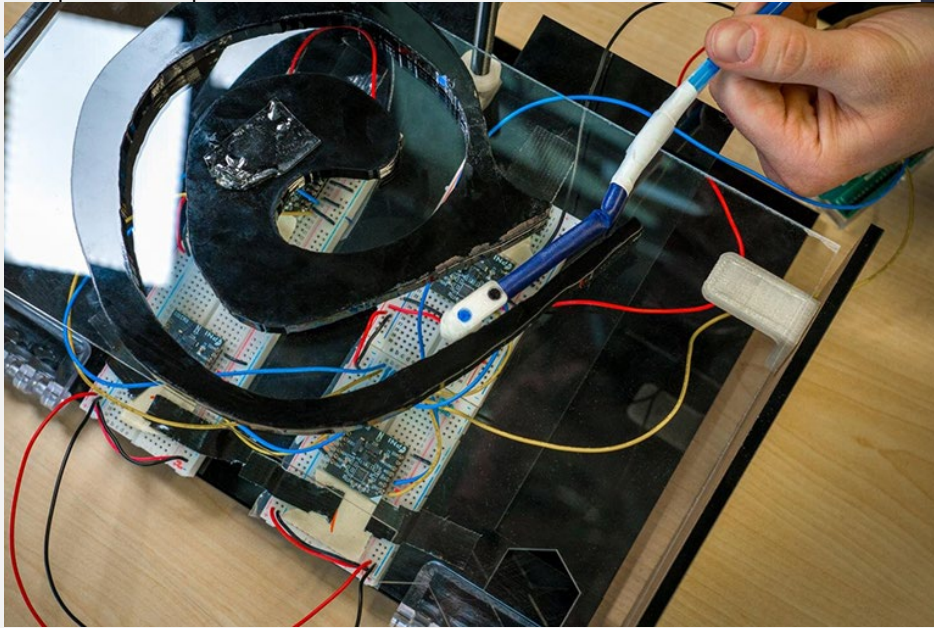
A case of RA with hyperextension deformity of the hallux interphalangeal joint was successfully treated and became symptom-free with opening wedge osteotomy of the medial cuneiform, plantar and proximal translation of the metatarsal head, and tenotomy of the extensor hallucis longus.

Reference:

Matsumoto T et al. Joint-Preserving Surgery for Hyperextension Deformity of the Hallux Interphalangeal Joint in a Patient with Rheumatoid Arthritis. Case Reports in Orthopedics. 2020; 5843095: 1-6 pages.

IN THE NEWS

A novel Magnetic Tracking System for Flexible Surgical Robots



Researchers have developed a magnetic tracking system for surgical robots to operate with dexterity within the body.

The technology does not require patient or clinician exposure to radiation, and is much less expensive than pre-existing monitoring techniques.

Device works in the way that a magnet is embedded in the tip of the robot and a series of sensors can track its location, while a neural network improves the accuracy of the tracking system.

These robots work well in highly constrained environments inside the body. They're inherently more compliant than rigid tools. But it becomes a lot harder to track their location and their shape inside the body. And if it is able to track them more easily that would be a great benefit both to patients and surgeons.

Current techniques to track robots involve X-ray exposure for medical staff and patients, and can be expensive.

This new approach is much less expensive, and does not require radiation. The system relies on the magnetic field produced by a magnet embedded in the tip of a flexible surgical robot.

Sensors in four numbers can detect this magnetic field when they are placed at specific locations near where the robot is operating, and a computer model then predicts the location of the robot based on this sensor data.

The computer system involved using a neural network to determine the difference between the actual and theoretical sensor values has helped the researchers to improve the accuracy of the system.

The system has been tested using a specific type of soft robot that can navigate delicate areas in the body as it is flexible and applies very little pressure to the structures it encounters.

A robot made of a very thin nylon that makes invert, almost like a sock, and pressurize with a fluid which causes the robot to grow, as robot is soft and moves by growing, it has very little impact on its surroundings, making it ideal for use in medical settings.

Reference:

Available at: <https://www.medgadget.com/2020/05/magnetic-tracking-system-for-flexible-surgical-robots.html>. Accessed on 13-07-2020.



This scientific input is prepared from the Department of Medical Services, an initiative of M/s Micro Labs Limited under the aegis of Micro Knowledge Academy. The information contained herein is for education purpose only. The content is developed by compiling information from various authentic and published literatures. Although great care has been taken to assure the accuracy of the publication, M/s Micro Labs Limited shall not be responsible or in any way liable for any inaccuracy, errors, or omissions resulting from negligence or otherwise howsoever or any consequences arising there from. In spite of best efforts, the information in this publication may become outdated over time. M/s Micro Labs Limited shall not be responsible in any manner whatsoever, for any action taken, opinions expressed, advice rendered or accepted, any direct, incidental, special or consequential loss and damage caused on the basis of any material or information presented in this publication / update