Rheumatoid forefoot

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Introduction: what's rheumatoid arthritis?

- The rheumatoid arthritis (RA) is an autoimmune disorder which touches the foot in 70% of the cases.

- 30% of the RA will be discovered by a foot deformity.

- But all the joint may be reached: hip, knee, shoulder, elbow, ...

- C1C2 cervical subluxation (15% SOO serie 2002): particular care for general anesthesia.
Introduction: what’s rheumatoid arthritis?

Sometimes, severe disease with extraarticular disorders

- Cutaneous: nodules, Sjögren syndrome, Raynaud syndrome
- Pleuropulmonar
- Pericarditis
- Neurological: mononeuritis

- Vasculitis: skin infarction/ ulceration
  = emergency++
Introduction: what’s rheumatoid arthritis?

A joint disorders

- Early **distal**, **bilateral** and **symmetric** oligoarthritis (**synovitis**): wrist, MCP, forefoot
  with sometimes joint instability

- With typical association with **tenosynovitis** with possible **compressive syndrom**: carpal tunnel, posterior tibialis and peroneus tendons.

- **Evolutive**: aggressive synovitis with cartilage and bone **erosion** (MTP)
  « static foot with fast evolution »
I- How to do the diagnosis?

I - Clinical exam

Early, inflammatory painful forefeet with MTP swelling and specific morning stiffness or secondary forefoot deformities

Don’t forget the hands (disorder in 90% of cases)

Stage 1  Stage 2  Stage 3
How to do the diagnosis?

I - Clinical exam

Don’t forget to see the hindfoot, the ankle, all the lower limb (hip and knee), the upper limb (shoulder and elbow), and look for extraarticular disorders.

Severe flatfoot sometimes associated.
How to do the diagnosis?

I - Clinical exam: forefoot

On the first ray, often non-specific deformities

Classical hallux valgus (83% in SOO serie)

or no hallux valgus
How to do the diagnosis?

I - Clinical exam

On the first ray: specific deformities

MTP1 luxation
with hallux flexus
Sometimes, IP ankylosis
or FHL rupture (bursitis)

Pannus = Subcutaneous nodule
How to do the diagnosis?

I - Clinical exam

On the lesser rays: non specific and often touched before the first ray

Lateral deviation of the lesser toes (extensor brevis)

Tibial deviation = Triangular foot
How to do the diagnosis?

I - Clinical exam

On the lesser rays: claw toes (forefoot splaying)

- Intrinseque muscles weakness
- Plantar plate rupture, dislocation
How to do the diagnosis?

I - Clinical exam

On the lesser rays: metatarsalgia

Callus
Nodule
Bursitis
Plantar plate rupture

Think to RA if inflammatory metatarsalgia with MTP swelling
How to do the diagnosis?

II- Complementary exams

1 - X rays: feet and hands

At the beginning

Juxta articular demineralisation
How to do the diagnosis?

II- Complementary exams

1 - X rays

At the beginning

Typical,
5th metatarsal
head erosion

Forefoot erosion 67% (SOO)
How to do the diagnosis?

II - Complementary exams

1 - X rays

Later:
Severe joint arthritis
  Narrow joint
  Erosion

Larsen score to follow the evolution
How to do the diagnosis?

II - Complementary exams

1 - X rays

MTP1 luxation

Complete erosion of MTP3 with luxation
How to do the diagnosis?

II - Complementary exams

2 – sonography ++

More sensible than clinical examination
Good evaluation of tenosynovitis
Early detection of erosion

Synovitis non specific but seen in 33% infraclinical
Synovitis & erosion = RA

Power doppler to diagnose inflammatory activity

Therapeutic follow up: Szkudlarek score (feet & hands)
How to do the diagnosis?

II - Complementary exams

2 - Sonography

- synovitis
- tenosynovitis
- tendinopathy
How to do the diagnosis?

II - Complementary exams

3 - Bone scan

To the diagnosis of inflammatory stage to avoid surgery at this stage but sonography is better
How to do the diagnosis?

II - Complementary exams

4 - MRI: early diagnosis

Bone lesions

Early diagnosis of erosion (6 to 12 months before X-ray)

Spongyous oedema

Soft tissue lesions

Intraclinical detection of synovitis and tenosynovitis

Sonography is better

Sugimoto et al. Radiology 2000
Ostendorf et al. Arthritis Rheum 2004
How to do the diagnosis?

II - Complementary exams

4 - MRI: soft tissue

Later: Synovitis and bone erosion
How to do the diagnosis?

II - Complementary exams

5 – blood tests++

**Non specific:**
Inflammatory syndrom: full blood count, erythrocyte sedimentation rate, C reactive Protein,

**Specific:**
Rheumatoid factors (IgM anti IgG): Latex, Waaler Rose
50 to 60% early RA
Anti CCP++ (anticyclic citrulline peptid antibodies)
specificity 95 to 98%

**Differential diagnosis:**
hepatitis B & C Serology, antinuclear antibodies
How to do the diagnosis?

II - Complementary exams

5 - Histologic exam

- Synovial liquid: non specific inflammation
- Synovial biopsy:
  - anticalthepsin immunostaining
  - icam-1 Immunostaining
How to do the diagnosis?

Early diagnosis

1987 : Criterion of the American College of Rhumatology (ACR) :

Clinic:
1 – morning articular stiffness more of 1 hour
2 – synovitis of more of 3 joints
   (IPP, MCP, wrist, elbow, knee, ankle, MTP)
3 – synovitis of more than 1 joint of the hand or wrist
4 – simultaneous symmetrical articular disorder
5 – subcutaneous rheumatoid nodule

Paraclinic:
6 – rheumatoid factors
7 – typical X ray anomalies on hand or wrist:
   juxtaarticular demineralisation or erosion

Rheumatoid arthritis if at least 4 criterions/7
but diagnosis of RA only after 2 to 3 years evolution
II - The treatment

The strategy

Early and aggressive medical treatment because of opportunity window

- to control the activity of the disease (inflammatory) and get to a clinic remission

- to prevent the joint disorders
The treatment

The strategy

**Medical treatment function of:**

- Stage of evolution

- Activity:
  - clinical examination score (DAS 28 = pain and swelling in 28 joints, ESR, EVA),
  - blood tests (anti CCP),
  - structural imagery evolution (Larsen = erosion and narrow joints)

- Prognostic factors: gender, characteristics, HLA DR (research)
Il a - The medical treatment

Symptomatics treatments:
Antiinflammatory drugs, corticoids

Infiltration control by sonography

bursitis

synovitis

No synoviorthesis in the forefoot
The medical treatment

DMARDs (disease modifying antirheumatic drugs)+++:

1 - Methotrexate (MTX)
2 – Leflunomid (Arava)
3 - Anti TNFα (Tumoral Necrosis Factor) : immunomodulators

**Drawbacks**: - cost: 15000 Euro / year for 2 & 3
- a little more risk of infection

**Indication**: 1st methotrexate (MTX) + NAIS or corticoid
Evolution 3 months after: X-ray, sonography, blood test
if stable: to follow methotrexate
if not controled: biotherapy + MTX

Essential role of the rhumatologist
The medical treatment

Associated therapy: Insoles, splints

Preventive
Corrective: non fixed deformities
Palliative: fixed disorders

From C. Palluet
The medical treatment

Associated therapy: Orthopedic shoes

- Esthetic / handicap
- Large and supple forefoot
- Low hindfoot fit / malleolus oedema
- Stable and heel less than 3 cms
- Rocker shoes sometimes
The medical treatment

Associated therapy: Physiotherapy

Again amyotrophy and stiffness

- To fight pain and inflammation
- To keep a good mobility of the joints
- To prevent deformities
- To maintain the gait and posture

Means:

- Massage: careful to precarious skin
- Manual mobility
- Proprioception
- Balneotherapy
- Electrotherapy
The medical treatment

Associated therapy: Psychologic help

- Deterioration of quality of life
- Socioprofessional repercussions
- Shortened life expectancy (5 to 10 years)

- Patient association
- Devices adapted to hands deformities
- Avoid obesity: increase the deformities
- Try to maintain professionnal activity

Health assessment questionnaire (HAQ)
II- b - The surgical treatment

Generally when severe deformities (1/3 RA)

1 - Preoperative exams

To evaluate:
- The evolution of the disease: erosion, luxation
- The stage of the deformities: inflammatory or not
- All the painful joints: the surgical strategy

X ray and sometimes pedobarography planning

What role does plantar pressure measurement have in the process of clinical decision making: application to the foot in rheumatoid arthritis

J. Woodburn
The surgical treatment

Chronology of the surgery

- C1C2 cervical instability first
- then upper limb for autonomy
- then foot (risk of infection)
- then hip and knee

Group the surgeries if possible:
Both forefeet
or hindfoot and forefoot of the same side

To avoid too much surgeries

Winning and stable surgery
The surgical treatment

Preoperative cares:

- Take care to the skin
- Vascular evaluation
- Stop DMARD 15 days before till 15 days after
- Antibioprophylaxis
The surgical treatment

2 - The procedures

Synovectomy:
2 indications:
- Intermetatarsal bursitis
- IP hallux isolated bursitis

Remove all the nodules
The surgical treatment

The bad procedures

The Keller procedure

Good results: 30 to 95%?

HV Recurrence

Bad alignment of lesser rays: Secondary metatarsalgia
The surgical treatment

The bad procedures

Silicone prosthesis, grommets

Complications: fracture, osteolysis with recurrence, infection, instability of the joint

Better / Keller for mobility but not for pain and stability (Denis)
The surgical treatment

The good procedures: traditional or conservative?
The surgical treatment

2 - The procedures

The approach

- Plantar elliptoid
- Dorsal transversal : skin necrosis
- Dorsal longitudinal

Dorsal better for extensor tendon lengthening
The surgical treatment

traditional

MTP1 fusion and resection alignment of the lesser metatarsal head

Synovectomy
Correct metatarsal arch and distal arch of the foot
Good position of the sesamoid bones
The surgical treatment

MTP1 fusion: technical aspect

The cut:
- cartilage resection with a blade
- cup and cone reamer

Take care to the FHL tendon
The surgical treatment

MTP1 fusion: technical aspect

The position: peroperative clinical evaluation

Load simulation test

2-3 cms

no 1st – 2nd toes contact

Rotation: nail orientation
IP flexion
The surgical treatment

MTP1 fusion: technical aspect

The position: peroperative clinical evaluation

Great toe ground contact
= no transfert metatarsalgia

Heel shoe < 4cm
The surgical treatment

MTP1 fusion: technical aspect

The fixation: ! osteoporosis

staples  screws  plate
The surgical treatment

MTP1 fusion: technical aspect

The need of a good ankle and hallux IP joint

If arthritis joint:

Ankle prosthesis

Hallux IP prosthesis plasty with hallux abductor tendon (Leemrijse)
The surgical treatment

Lesser metatarsal head resection alignment

- Resection of the lateral metatarsal heads first
- Section on the neck plantar and backward
  Second cut on the plantar angle
  ! Avoid to forget piece of bone
- Axial K wiring (fibrous space)
The surgical treatment

Lesser metatarsal head resection

After resection, replacement of the head by:

*buttom prosthesis (Chauveau – sfmcp Strasbourg 2000)*

Lesser toes ground contact = 10%

Result: excellent 32, good 44, Intermediate or bad: 24%

Recurrence of toes deviation 12/25
1 case of ischemic toe
The surgical treatment

Lesser metatarsal head resection

After resection, replacement of the head by silicone prosthesis (Gauthier, Maestro, Tourné)

From Dr Tourné
The surgical treatment

Claw toes

- IP mobilisation
- Extensor tendons lengthening (Green or longus on brevis transfert)
- Section of extensor brevis
- Arthroplasty: rare

K wiring?
Migration, fracture, infection
The surgical treatment

Conservative treatment =

M1 Scarf osteotomy + lateral Weil osteotomies
(Barouk & Toullec, Valtin & Leemrijse, Diebold)

Only if good cartilage
The surgical treatment

Conservative treatment =

M1 Weil osteotomy + lateral Weil osteotomies
(Valtin & Leemrijse)
The surgical treatment

Conservative treatment

Good result only if shortening+++
The surgical treatment

Conservative treatment

Is it a good indication for long time?
The surgical treatment

Conservative treatment

Shortening of the first ray even if no hallux valgus
The surgical treatment

Conservative treatment

Buttom prosthesis for IP arthritis better than fusion
Possibility of removing if non tolerated
The surgical treatment

Postoperative care

Difficulties to use clutches

Heelsupport shoes for 6 to 8 weeks
The surgical treatment

3 - results

SOO 2002:
278 forefeet
75% good results

Complications:
infection 2%,
second surgery 19% (hardware)
MTP1 asymptomatic non healing 15%
16% symptomatic recurrence of claw toes

Best result if:
- surgery on all rays
- Large resection of metatarsal head (8mm of space)
- Claw toes: extensor tendon lengthening better than section
- K wiring
- Dorsal approach
- Good X ray metatarsal arch
The surgical treatment

3 - results

- Barouk LS: 5% recurrence metatarsalgia: Technical insufficiency or remaining nodule. Only 22% MTP1 fusion/scarf and 72% conservative surgery on lesser rays.

- Leemrijse, Valtin: 91 forefeet (64 patients)
  - 90% good results
  - 9 bad results: wound healing delay, hematoma
  - 7 MTP1 asymptomatic non healing
The surgical treatment

complication

2 surgeries before

Infection (anaerobia)
Skin Necrosis
What to do?

Symetric MTP3 painful joint 3 years after hallux valgus surgery (scarf procedure): rheumatoid arthritis
conclusion

Rheumatoid arthritis is diagnosed earlier today with the sonography and blood tests (antiCCP).

This is essential to begin rapidly the treatment and thanks to the DMARDS, we often avoid the joint destructions.

Probably, the conservative treatment will become more often indicated to get a secure and more functional result than MTP1 fusion and resection of metatarsal heads always a good solution.

Thank you