Management of Haemophiliac Arthropathy

Orthopaedic Point of View

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Haemophilia

- Deficiency of clotting factor VIII, and
- Christmas disease—deficiency of factor IX
  - >40% compatible with normal control of haemorrhage
- Affect intrinsic clotting cascade, prolonged APTT
  - X-Linked recessive
  - 1/10000

Severity

- Depends on level of clotting factor VIII
- 50% moderate – severe / moderate
  - >50%: normal
  - 25-50%: seldom have problems
  - 5-25%: severe bleeding with operation (mild)
  - 1-5%: Perfuse bleeding after minor injury (moderate)
  - <1% spontaneous bleeding (severe)

Mostly affect KNEE JOINT
Other: elbow, shoulder, hip, ankle, wrist

Epidemiology of Haemophilic joint disease

- 5% of 1st bleeding episodes in Hemophilic boys
- 1.91 +/- 0.91 yrs old
- Spontaneous/ trauma
- Episodic therapy group x6 higher annual intra-articular bleeding than prophylactic group
- No. and Volume of Intra-articular bleedings result in target joint and arthropathy not understood

(Hideyuki Takedani 2013. Total Joint Arthroplasty for Hemophilia)
Pathology

• Frequent spontaneous joint and muscle haemorrhage.

• Synovial irritation, inflammation and subsynovial fibrosis.

• Bleeding in muscle – muscle necrosis, fibrosis, contracture, even neuroprexia

• Cyst, pseudotumor formation

Pathogenesis of Haemophilia

Recurrent intra-articular bleeding

• Synovitis

• Proliferation of synovium → synovial hypertrophy

• Bleeding from frail capillaries of the inflammed synovium

• Haemosiderin accumulate over the synovium / joint cartilage
Pathogenesis of Haemophilia (2)

- Lysosomal enzymes erode cartilage
- Exposure of subchondral bone → subchondral cyst
- Osteoporosis develops due to disuse and local hyperaemia
- Increase blood flow to joint → epiphyseal overgrowth and osteophytes

Pseudotumour

- Due to subperiosteal or intraosseous bleeding
- Subperiosteal bleeding: periosteal stripping and new bone formation
- Intraosseous bleeding: ill-defined lesion with osteolysis and some new bone formation

Clinical features

- Young man
- Wasted limbs muscle.
- Knee, ankle joint contracture.
- Knee effusion
- +/- compartment syn
- Limbs sensory impairment

X-ray changes

- A) Cartilage intact
- B) Joint space narrowing
- C) Bony erosion, joint deformed and unstable
- D) Early subluxation
Management of Haemophiliac Arthropathy

Staging—Arnold and Hilgartner (1977)

Stage I --- Soft tissue swelling
Stage II --- Osteoporosis and epiphyseal overgrowth
Stage III --- Slight narrowing joint space and squaring of bone ends.
Stage IV --- Marked narrowing articular space
Stage V --- Joint disintegration

Treatment Algorithm

Haemorrhagic Episode → Multiple Haemorrhagic Episodes → Synovitis/ Gross Joint Destructions

FIGURE 1—59 Radiographic changes of hemophilia

• A, AP radiograph of the knee shows enlargement and ballooning of the distal femur, flattening of the distal femoral condyles, marked joint space narrowing, and severe widening of the intercondylar notch (arrows)

• B and C show the variable radiographic changes that can occur in the patella, with B appearing “squared off” (Jordan’s sign) and C appearing elongated and thinned. (From Resnick D, Niwayama G: Diagnosis of Bone and Joint Disorders, p 2025. Philadelphia, WB Saunders, 1981.)
Orthopaedic management for haemophilic arthropathy in the knee?

- Early diagnosis
- Acute bleed:
  - Pain relief by analgesics and splintage (<2 days)
  - Immediate factor replacement
  - Avoid joint aspiration
  - Early physio

- Chronic arthropathy
  - Aim is to prevent joint contracture, stiffness and progressive muscle weakness.
  - Under cover of factor infusion, for physo, intermittent splintage

Operative treatment

- Tendon lengthening to correct contractures
- Osteotomy to correct established deformities
- Arthrodesis for painful joint destruction.
- Synovestomy
- +/- TJR
- Peri-operative clotting factor conc. requirement:  
  Factor VIII >25%,  Factor IX >15%

Treatment

Acute Haemarthrosis:

- Immediate iv factor VIII to level of 30%
  - 1U/kg increase level to 2%
  - May treat at home
- Immobilize limb for 1st 24 hr
- ? Aspiration or washout
  - Temporary symptom relief
  - No evidence it decreases risk of arthropathy
**Subacute Haemarthropathy**

- Failure to respond to prior mentioned Rx
- 2 or 3 bleeds in short period of time
- ? Intra-articular prednisolone x 5/7
- Keep factor VIII > 20% for 6 weeks

**Chronic Haemarthropathy**

- Non-operative: 6/12 of small dose of prednisone
- Synovectomy: - not indicated if > stage 3
- Corrective surgery: for stage 4 – 5
  - CI: antibody of factor VIII
  - Osteotomy
  - Arthrodesis
  - Joint arthroplasty

**Hyaluronic Acid**

- Goal:
  - Viscosupplementation
  - Delaying need of operative treatment when noninvasive medical therapy (relative rest, oral anti-inflammatory drugs, oral analgesics and physical therapy) has failed
- Indications:
  - mild-to-moderate OA changes on Xrays
  - Symptomatic

**Benefits from Medical Literature**

- Diminishes pain
- Improves disability

- But generally within 1 week and for up to 3-12 months
  (Response more prominent at 5th-13rd wk postinjection period)

*(Rodriguez-Merchan EC 2012)*
Radiosynovectomy (RSV)

- Invasive Medical Treatment by Haematologists
- Timing Not Defined
- Yttrium-90 or Rhenium-186

**Benefits:**
- non invasive
- decreases frequency & intensity of recurrent ankle bleeding episodes related to ankle synovitis

**But Radiation Risks:**
- 408 patients (ages 3-51) received 1-3 RS (total 842) and follow-up was 6 months to 9 yrs
  - One case of Radiation induced sarcoma

*(Thomas S et al. 2013)*

![Schneider P. J Nucl Med. 2005 Jan;46 Suppl 1:48S-54S.](image)

![Rodriguez-Merchan EC. J Foot Ankle Surg. 2012 Nov-Dec;51(6):772-6.](image)
Alternative: Chemical Synovectomy

- Chemical synovectomy with rifampicin is expected to produce similar results to 90Y in the small joints (elbows & ankles)
- but several weekly, painful injections are needed;
- Not recommended for the knee joint

Surgical Synovectomy

- Open vs arthroscopic
- Hemostasis in the perioperative period is paramount
- Reported post-op bleeding, need infusion of bypassing agents due to the presence of inhibitors, a topical hemostatic agent, FLOSEAL, and absorbable Gelfoam
  
(Garcia Ariz M 2012)

Indications

- when 3 early consecutive radiosynovectomies (repeated every 6 months) fail to halt synovitis, arthroscopic synovectomy should be considered

RSV vs Surgical Synovectomy

• RSV:
  – equivalent results
  – Beneficial for factor inhibitors
  – costs less (less replacement therapy)
  – allows the patient to remain ambulatory
  – repeatable.
  – Therefore, considered the initial procedure of choice
  (Risks: cutaneous burn if out of joint/ inflammatory response)

Advanced Arthropathy

• Proceed either arthrodesis or total joint replacement for advanced arthropathy

Precautions

• Arthroplasty/arthrodesis to be done in dedicated Haemophilia Centers

• Longer Length of Stay:
  – Perioperative Coagulation preparation
  – Observation of wound

• More Consumptions:
  – Factor concentrates
  – Inhibitors

Treatment Goals

• Arthroplasty:
  – Stable
  – Pain-free
  – Mobile Joint

• Arthrodesis:
  – Stable
  – Pain-free
  – Limb
Total Knee Arthroplasty (TKA)

Total Hip Arthroplasty (THA)

Complications of Total Joint Arthroplasty

- Higher infection rate
  - Increased wound bleeding -> delayed wound healing
  - 10-16% vs 1-2% in General Population
- Higher revision rate or shorter durability
  - TKA 94% at 20 yrs
  - THA 89% at 8.5 yrs
- Deep venous thrombosis (DVT)
  - Coagulation factor level is normalized by administration of concentrates at peri-operative periods

(Hideyuki Takedani 2013. Total Joint Arthroplasty for Hemophilia)

Arthrodesis in Advanced Disease