

Management of Haemophilic 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**)

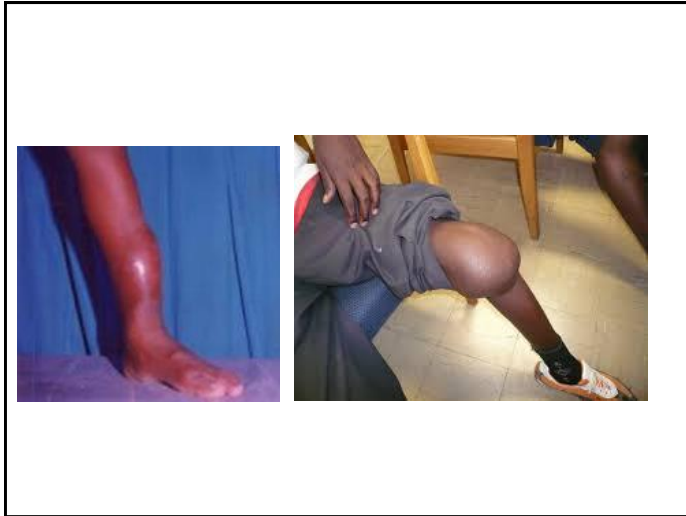
Mostly affect **KNEE JOINT**

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 inflamed 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

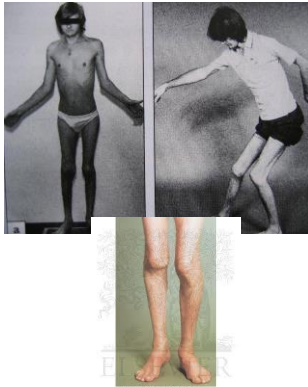
- Due to subperiosteal or intraosseous bleeding
- Subperiosteal bleeding: periosteal stripping and new bone formation
- Intraosseous bleeding: ill-defined lesion with osteolysis and some new bone formation



Clinical features

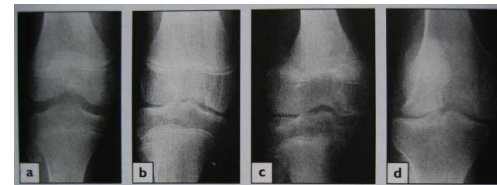
Usually you will not get such a patient, because of severe pain.

- **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**



Staging---Arnold and Hilgartner (1977)

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

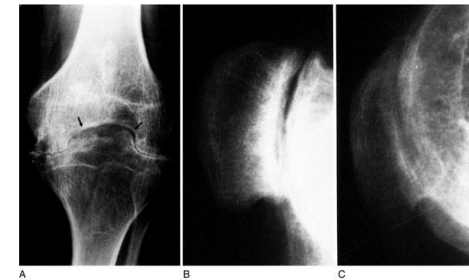
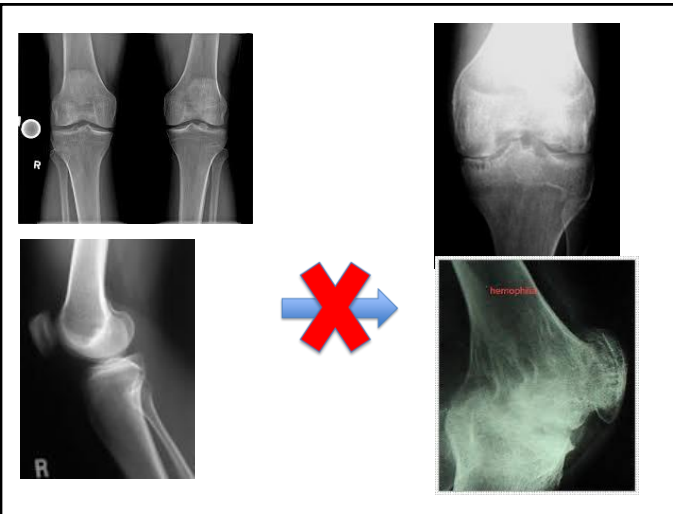
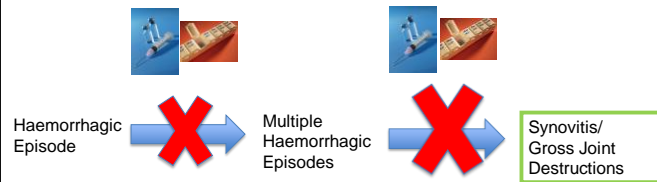
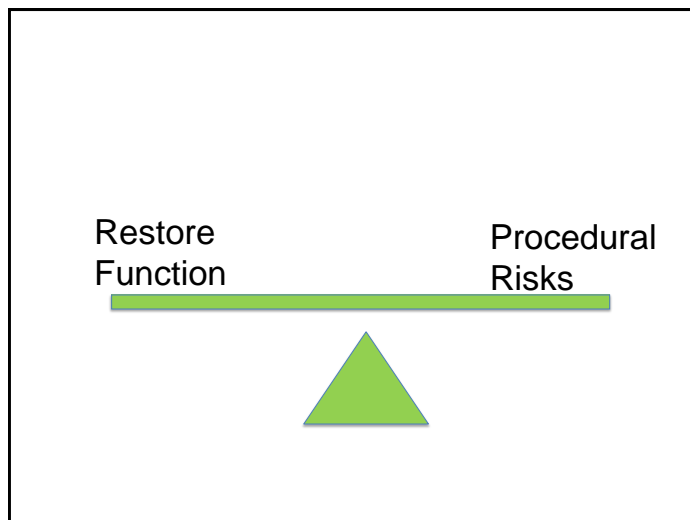


FIGURE 1-59 Radiographic changes of hemophilia
 •A, AP radiograph of the knee shows enlargement and ballooning of the distal femur, flattening of the distal femoral condyles, marked joint space narrowing, and severe widening of the intercondylar notch (arrows)
 •B and C show the variable radiographic 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.)

Treatment Algorithm





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 physio, intermittent splintage


Operative treatment

- Tendon lengthening to correct contractures
- Osteotomy to correct established deformities
- Arthrodesis for painful joint destruction.
- Synovectomy
- +/- 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)*

Periodic Table of the Elements © www.elementsdatabase.com



Schneider P. J Nucl Med. 2005 Jan;46 Suppl 1:48S-54S.

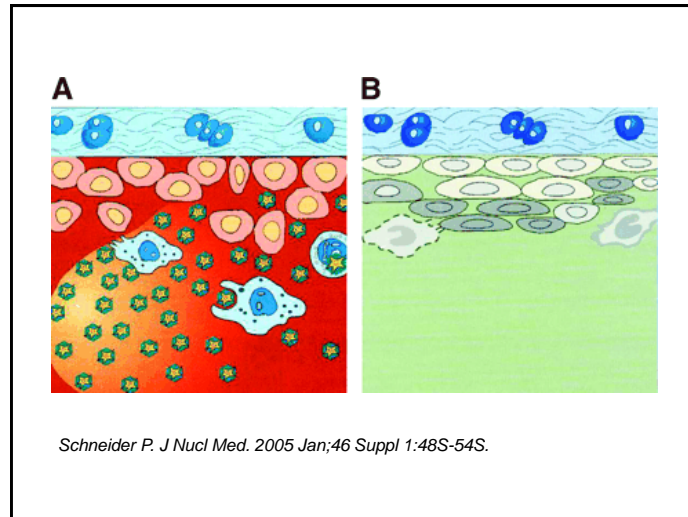


Rodríguez-Merchan EC. J Foot Ankle Surg. 2012 Nov-Dec;51(6):772-6.

Recommended Radionuclide and Activity per Injection for Radiosynovectomy of Different Joints

Joint	Radionuclide	Recommended activity (MBq)
Knee	⁹⁰ Y	185–222
Hip	¹⁸⁶ Re	74–185
Shoulder	¹⁸⁶ Re	74–185
Elbow	¹⁸⁶ Re	74–111
Wrist	¹⁸⁶ Re	37–74
Ankle	¹⁸⁶ Re	74
Subtalar	¹⁸⁶ Re	37–74
Metacarpophalangeal	¹⁶⁹ Er	20–40
Metatarsophalangeal	¹⁶⁹ Er	30–40
Proximal interphalangeal	¹⁶⁹ Er	10–20

Schneider P. J Nucl Med. 2005 Jan;46 Suppl 1:48S-54S.



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
(García Aríz M 2012)

Indications

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



Rodríguez-Merchan EC. *Haemophilia.* 2012 Jan;18(1):8-16.

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

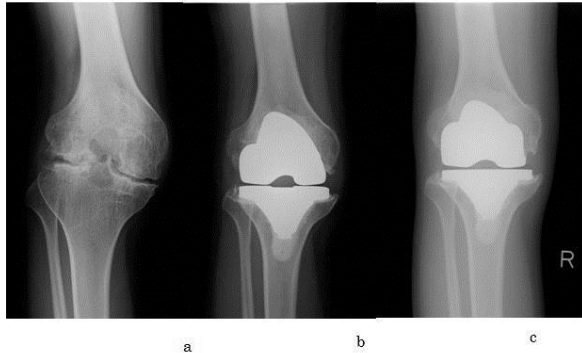
Precautions

- Arthroplasty/arthrodesis to be done in dedicated Haemophilia Centers
- Longer Length of Stay:
 - Perioperative Coagulation preparation
 - Observation of wound
- More Consumptions:
 - Factor concentrates
 - Inhibitors

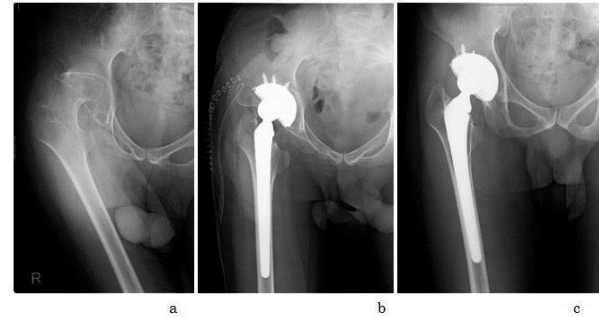
Treatment Goals

- 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



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