Common and New Orthopaedic/Physical Therapy Recommendations

Mauricio Silva MD
Common and New Orthopaedic/PT Recommendations

WFH GUIDELINES
Guidelines for the management of hemophilia
Recommendations regarding the clinical management of people with hemophilia

Practice statements are in **bold** in text.

All such statements are supported by the best available evidence in the literature.

Grading was performed professionally as per 2011 Oxford Centre for Evidence-Based Medicine.
### Levels of evidence

**Oxford Center for Evidence-Based Medicine 2010**

<table>
<thead>
<tr>
<th>Question</th>
<th>Step 1 (Level 1*)</th>
<th>Step 2 (Level 2*)</th>
<th>Step 3 (Level 3*)</th>
<th>Step 4 (Level 4*)</th>
<th>Step 5 (Level 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How common is the problem?</td>
<td>Local and current random sample surveys (or censuses)</td>
<td>Systematic review of surveys that allow matching to local circumstances**</td>
<td>Local non-random sample**</td>
<td>Case-series**</td>
<td>n/a</td>
</tr>
<tr>
<td>Is this diagnostic or monitoring test accurate? (Diagnosis)</td>
<td>Systematic review of cross-sectional studies with consistently applied reference standard and blinding</td>
<td>Individual cross-sectional studies with consistently applied reference standard and blinding</td>
<td>Non-consecutive studies, or studies without consistently applied reference standards**</td>
<td>Case-control studies, or &quot;poor or non-independent reference standard&quot;**</td>
<td>Mechanism-based reasoning</td>
</tr>
<tr>
<td>What will happen if we do not add a therapy? (Prognosis)</td>
<td>Systematic review of inception cohort studies</td>
<td>Inception cohort studies</td>
<td>Cohort study or control arm of randomized trial*</td>
<td>Case-series or case control studies, or poor quality prognostic cohort study**</td>
<td>n/a</td>
</tr>
<tr>
<td>Does this intervention help? (Treatment Benefits)</td>
<td>Systematic review of randomized trials or n-of-1 trials</td>
<td>Randomized trial or observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study**</td>
<td>Case-series, case-control studies, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
</tr>
<tr>
<td>What are the COMMON harms? (Treatment Harms)</td>
<td>Systematic review of randomized trials, systematic review of nested case-control studies, n of-1 trial with the patient you are raising the question about, or observational study with dramatic effect</td>
<td>Individual randomized trial or (exceptionally) observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study (postmarketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**</td>
<td>Case-series, case-control, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
</tr>
<tr>
<td>What are the RARE harms? (Treatment Harms)</td>
<td>Systematic review of randomized trials or n-of-1 trial</td>
<td>Randomized trial or (exceptionally) observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study**</td>
<td>Case-series, case-control, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
</tr>
<tr>
<td>Is this (early detection) test worthwhile? (Screening)</td>
<td>Systematic review of randomized trials</td>
<td>Randomized trial</td>
<td>Randomized trial</td>
<td>Case-series, case-control, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
</tr>
</tbody>
</table>
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WFH Intention

- Useful to those initiating and maintaining hemophilia care programs.
- Extensive review of the literature
- Encourage practice harmonization around the world
- Stimulate studies where practice recommendations lack adequate evidence
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Hemophilia

- Sex-linked genetic disorder
- Deficiency of clotting factor
- Hemophilia A: Factor VIII
- Hemophilia B: Factor IX
- 1:7,500 live male births
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Hemophilia: Clinical Progression

Normal Joint  Acute Bleeding  Chronic Synovitis  Early Arthritis  End Stage Arthritis
<table>
<thead>
<tr>
<th>Site of bleeding</th>
<th>Approximate frequency %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemarthrosis</td>
<td>70–80</td>
</tr>
<tr>
<td>More common into hinged joints:</td>
<td></td>
</tr>
<tr>
<td>ankles, knees, and elbows</td>
<td></td>
</tr>
<tr>
<td>Less common into multi-axial joints:</td>
<td></td>
</tr>
<tr>
<td>shoulders, wrists, hips</td>
<td></td>
</tr>
<tr>
<td>Muscle</td>
<td>10–20</td>
</tr>
<tr>
<td>Other major bleeds</td>
<td>5–10</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>
Physical activity should be encouraged to promote physical fitness and normal neuromuscular development, with attention paid to muscle strengthening, coordination, general fitness, physical functioning, healthy body weight, and self-esteem. (Level 2) [15]

Bone density may be decreased in people with hemophilia. [16,17]

For patients with significant musculoskeletal dysfunction, weight-bearing activities that promote development and maintenance of good bone density should be encouraged, to the extent their joint health permits. (Level 3) [16]

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Hemophilia: Clinical Progression

- Normal Joint
- Acute Bleeding
- Chronic Synovitis
- Early Arthritis
- End Stage Arthritis
1.2 Principles of care

1. The primary aim of care is to prevent and treat bleeding with the deficient clotting factor.

2. Whenever possible, specific factor deficiency should be treated with specific factor concentrate.

3. People with hemophilia are best managed in a comprehensive care setting (see ‘Comprehensive Care’).

4. Acute bleeds should be treated as quickly as possible, preferably within 2 h. If in doubt, treat. (Level 4) [2]
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Definition of Response to Treatment of Acute Hemarthrosis

- **Excellent**: Complete pain relief within 8 hours and/or complete resolution of signs of bleeding after the initial injection and not requiring any further replacement therapy within 72 hours.
- **Good**: Significant pain relief and/or improvement in signs of bleeding within approximately 8 hours after a single injection, but requiring more than one dose of replacement therapy within 72 hours for complete resolution.
- **Moderate**: Modest pain relief and/or improvement in signs of bleeding within approximately 8 hours after the initial injection and requiring more than one injection within 72 hours but without complete resolution.
- **None**: None or minimal improvement, or condition worsens, within approximately 8 hours after the initial injection.

The above definitions of response to treatment of an acute hemarthrosis relate to inhibitor negative individuals with hemophilia. These definitions may require modification for inhibitor positive patients receiving bypassing agents as hemostatic cover or patients who receive factor concentrates with extended half-lives.
Acute Hemarthrosis: Induction of Cartilage Damage

Inhibition of Proteoglycan Synthesis

Mononuclear Cells

Pro-inflammatory Cytokines
- IL-1β
- IL-6
- TNFα

Chondrocyte

Oxygen Metabolites

Red Blood Cells

Iron

Toxic Hydroxyl Radicals

Roosendaal G et al. J Rheumatol 1997
Hoiveld M et al. Rheumatology (Oxford) 2003
Bates E et al. Annals of the Rheumatic Diseases 1984,
### Acute Bleeding - Factor Replacement Therapy

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Episodic (on-demand treatment)</td>
<td>Treatment given at the time of clinically evident bleeding</td>
</tr>
<tr>
<td>Continuous prophylaxis</td>
<td>Regular continuous* treatment initiated in the absence of documented osteochondral joint disease, determined by physical examination and/or imaging studies, and started before the second clinically evident large joint bleed and age 3 years**</td>
</tr>
<tr>
<td>Primary prophylaxis</td>
<td>Regular continuous* treatment started after 2 or more bleeds into large joints** and before the onset of joint disease documented by physical examination and imaging studies</td>
</tr>
<tr>
<td>Secondary prophylaxis</td>
<td>Regular continuous* treatment started after the onset of joint disease documented by physical examination and plain radiographs of the affected joints</td>
</tr>
<tr>
<td>Tertiary prophylaxis</td>
<td>Treatment given to prevent bleeding for periods not exceeding 45 weeks in a year</td>
</tr>
<tr>
<td>Intermittent (periodic) prophylaxis</td>
<td>*Continuous is defined as the intent of treating for 52 weeks per year and receiving a minimum of an a priori defined frequency of infusions for at least 45 weeks (85%) of the year under consideration. **Large joints = ankles, knees, hips, elbows and shoulders.</td>
</tr>
</tbody>
</table>
Randomized trial

65 boys (<30 months of age)

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Tradeoff Between Initiation of Treatment and Joint Pathology

- Treatment of pain and serious bleeding
- Improvement of target joints
- Improves normal activities of daily life
- Minimal musculoskeletal disease
- Near normal musculoskeletal & psycho-social development

Episodic treatment
Short-term prophylaxis
Tertiary prophylaxis (after onset of joint disease)
Secondary prophylaxis (after second joint bleed)
Primary prophylaxis (before second joint bleed)

Age in years
0 5 10 15 20 25 30 35 40

Adapted from Blood Transfus 2008 Sep;6 Suppl 2:s4-11
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Chronic Synovitis

Hypervascularity

Chronic synovial inflammation
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Arthropathy: Natural History

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Arthropathy: Natural History

Fig. 3. Mean Pettersson scores according to cumulative number of joint bleeds.

Pettersson score (max 78)

Cumulative no. of joint bleeds

Removal of blood from a joint: may be considered in the following situations:

- A bleeding, tense, and painful joint, which shows no improvement 24 h after conservative treatment
- Joint pain that cannot be alleviated
- Evidence of neurovascular compromise of the limb
- Unusual increase in local or systemic temperature and other evidence of infection (septic arthritis) (Level 3) [4,9,10]

Mononuclear Cells

Pro-inflammatory Cytokines
- IL-1β
- IL-6
- TNFα

Chondrocyte

Oxygen Metabolites

Red Blood Cells

Iron

Toxic Hydroxyl Radicals

MR16-1 (anti IL-6) TNFα Receptor antagonist IL-10

Induction of Cartilage Damage

Mononuclear Cells

Pro-inflammatory Cytokines
- IL-1β
- IL-6
- TNFα

Chondrocyte

Oxygen Metabolites

Red Blood Cells

Iron

Toxic Hydroxyl Radicals

MR16-1 (anti IL-6)
TNFα Receptor antagonist
IL-10

Prevention of Hemophilic Arthropyathy

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Hemophilia: Clinical Progression

- Normal Joint
- Acute Bleeding
- Chronic Synovitis
- Early Arthritis
- End Stage Arthritis
Synovectomy should be considered if chronic synovitis persists with frequent recurrent bleeding not controlled by other means.

Options for synovectomy include chemical or radioisotopic synoviorthesis, and arthroscopic or open surgical synovectomy. (Level 4)

Caviglia HA et al Haemophilia.2001; 7(Suppl. 2)
Arthroscopic Synovectomy

Highly effective

- Widel JD, CORR, 1996
- Eickhoff HH et al., CORR, 1997
- Dunn AL et al, J. Ped. Orthop, 2004

- Major surgery
- Clotting factor
- Hospitalization
- Arthrofibrosis
- Range of motion
- Physical therapy
- Patients with inhibitors
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Arthroscopic Synovectomy for Hemophilic Joint Disease in a Pediatric Population

Amy L. Dunn, MD, * Michael T. Busch, MD, † J. Bradley Wyly, MD, ‡ Kevin M. Sullivan, PhD, MPH, MHA, § and Thomas C. Abshire, MD *

*J Pediatr Orthop • Volume 24, Number 4, July/August 2004

Frequency of bleeding decline of 84%

- 69 procedures in 44 patients
- Age range: 4 – 18 y
- Mean F/U: 6.6 y
- 4 – 10 weeks of clotting factor;
  23 patients >6 months

<table>
<thead>
<tr>
<th>Joint</th>
<th>Pre-AS</th>
<th>One Year</th>
<th>Last Available</th>
<th>Follow-up (median)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankle (n = 28)</td>
<td>35°–85° (60°)</td>
<td>25°–70° (60°)</td>
<td>20°–80° (52.5°)</td>
<td>2.3–10.7 y (7.2)</td>
</tr>
<tr>
<td>Elbow (n = 15)</td>
<td>75°–150° (125°)</td>
<td>80°–151° (130°)</td>
<td>68°–150° (120°)</td>
<td>1.8–10.1 y (6.8)</td>
</tr>
<tr>
<td>Knee (n = 4)</td>
<td>120°–140° (125°)</td>
<td>90°–130° (115°)</td>
<td>100°–120° (106°)</td>
<td>6–12.5 y (11)</td>
</tr>
<tr>
<td>Shoulder (n = 1)</td>
<td>155°</td>
<td>180°</td>
<td>180°</td>
<td>2.5 y</td>
</tr>
</tbody>
</table>

AS, arthroscopic synovectomy.
Non-surgical synovectomy is the procedure of choice.

Radioisotopic synovectomy using a pure beta emitter (phosphorus-32 or yttrium-90) is highly effective, has few side effects, and can be accomplished in an outpatient setting. (Level 4) [18,19]

19 Van Kasteren ME, et al, Ann Rheum Dis 1993; 52:
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Non-Surgical Synovectomy: Up to 2000

Map showing distribution of treatments such as Au^{198}, P^{32}, Y^{90}, Re^{186}, Rifampicin, and Osmic Acid.
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Non-Surgical Synovectomy: 2010
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**Radiosynovectomy**

**Ideal Candidate**
- **Frequent hemarthrosis:** 2-3 bleeds/month
- **Target joint**
- **Failed conservative treatment with clotting factor replacement and PT**
- **No radiological evidence of joint damage**

<table>
<thead>
<tr>
<th>Radiation</th>
<th>$^{32}$P</th>
<th>$^{90}$Y</th>
<th>$^{198}$Au</th>
<th>$^{86}$Re</th>
<th>$^{165}$Dy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size (μ)</td>
<td>6-20</td>
<td>10-20</td>
<td>3</td>
<td>0.1</td>
<td>3-5</td>
</tr>
<tr>
<td>Penetration (mm)</td>
<td>3-5</td>
<td>4-10</td>
<td>1-4</td>
<td>1-4</td>
<td>6</td>
</tr>
<tr>
<td>Half life (days)</td>
<td>14</td>
<td>2.4</td>
<td>2.7</td>
<td>3.8</td>
<td>0.1</td>
</tr>
</tbody>
</table>
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Radiosynovectomy

- **Procedure**
- Simple
- Outpatient department
- Local anesthetic
- Joint access
- Drainage
- Injection of $^{32}\text{P}$
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Radiosynovectomy

Effectively reduces frequency of bleeding

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Radiosynovectomy

Outcome: Excellent or good results: 80%

- **Excellent + Good** = >75% bleeding reduction
- **Excellent** = 100% bleeding reduction

No excess of malignancies:

- Compared malignancies in 2,412 Quebec patients who had received RS with an age-matched general population

<table>
<thead>
<tr>
<th></th>
<th>Expected</th>
<th>Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukemia</td>
<td>4.35</td>
<td>5</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>9.11</td>
<td>10</td>
</tr>
<tr>
<td>Primary Malignancies</td>
<td>157.8</td>
<td>151</td>
</tr>
</tbody>
</table>
Selective therapeutic embolization with gelfoam or polyvinyl alcohol

Significant decrease in frequency of bleeding

Promising results
Supervised physiotherapy aiming to preserve muscle strength and functional ability is a very important part of management at this stage.

Secondary prophylaxis may be necessary if recurrent bleeding occurs as a result of physiotherapy. (Level 2) [9,10]

Pain Management in Hemophilia Arthropathy - Strategies

- Pain should be controlled with appropriate analgesics
- Certain COX-2 inhibitors may be used to relieve arthritic pain (Level 2) [13,14]


<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | Paracetamol/acetaminophen
   If not effective |
| 2 | COX-2 inhibitor (e.g., celecoxib, meloxicam, nimesulide, and others; OR
   Paracetamol/acetaminophen plus codeine (3–4 times per day)
   OR
   Paracetamol/acetaminophen plus tramadol (3–4 times per day) |
| 3 | Morphine: use a slow release product with an escape of a rapid release. Increase the slow release product if the rapid release product is used more than 4 times per day |
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Hemophilia: Clinical Progression

Normal Joint  Acute Bleeding  Chronic Synovitis  Early Arthritis  End Stage Arthritis
Surgery for patients with hemophilia will require additional planning and interaction with the healthcare team than what is required for other patients.

A hemophilia patient requiring surgery is best managed at or in consultation with a comprehensive hemophilia treatment center. (Level 3) [50,51]

The anesthesiologist should have experience treating patients with bleeding disorders.

Adequate laboratory support is required for reliable monitoring of clotting factor level and inhibitor testing.

Preoperative assessment should include inhibitor screening and inhibitor assay, particularly if the recovery of the replaced factor is significantly less than expected. (Level 4) [52,53]

Surgery should be scheduled early in the week and early in the day for optimal laboratory and blood bank support.

Adequate quantities of clotting factor concentrates should be available for the surgery itself and to maintain adequate coverage postoperatively for the length of time required for healing and/or rehabilitation.

If clotting factor concentrates are not available, adequate blood bank support for plasma components is needed.

The dosage and duration of clotting factor concentrate coverage depend on the type of surgery performed (Tables 7-1, 7-2).
## Suggested Plasma Factor Peak Levels and Duration

<table>
<thead>
<tr>
<th>Type of hemorrhage</th>
<th>Hemophilia A</th>
<th>Hemophilia B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desired level (IU dL⁻¹)</td>
<td>Duration (days)</td>
</tr>
<tr>
<td>Joint</td>
<td>40-60</td>
<td>1-2, may be longer if response is inadequate</td>
</tr>
<tr>
<td>Superficial muscle/no NV compromise (except iliopsoas)</td>
<td>40-60</td>
<td>2-3, sometimes longer if response is inadequate</td>
</tr>
<tr>
<td>Iliopsoas and deep muscle with NV injury, or substantial blood loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>80-100</td>
<td>1-2</td>
</tr>
<tr>
<td>Maintenance</td>
<td>30-60</td>
<td>3-5, sometimes longer as secondary prophylaxis during physiotherapy</td>
</tr>
<tr>
<td>CNS/head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>80-100</td>
<td>1-7</td>
</tr>
<tr>
<td>Maintenance</td>
<td>50</td>
<td>8-21</td>
</tr>
<tr>
<td>Throat and neck</td>
<td>80-100</td>
<td>1-7</td>
</tr>
<tr>
<td>Initial</td>
<td>50</td>
<td>8-14</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>80-100</td>
<td>7-14</td>
</tr>
<tr>
<td>Maintenance</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Renal</td>
<td>50</td>
<td>3-5</td>
</tr>
<tr>
<td>Deep laceration</td>
<td>50</td>
<td>5-7</td>
</tr>
<tr>
<td>Surgery (major)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-op</td>
<td>80-100</td>
<td>1-3</td>
</tr>
<tr>
<td>Post-op</td>
<td>60-80</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>40-60</td>
<td>7-14</td>
</tr>
<tr>
<td>Surgery (minor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-op</td>
<td>50-80</td>
<td>1-5, depending on type of procedure</td>
</tr>
<tr>
<td>Post-op</td>
<td>30-80</td>
<td>1-5, depending on type of procedure</td>
</tr>
</tbody>
</table>
If these conservative measures fail to provide satisfactory relief of pain and improved functioning, surgical intervention may be considered.

Surgical procedures, depending on the specific condition needing correction, may include:

- Extra-articular soft tissue release to treat contractures.
- Arthroscopy to release intra-articular adhesions and correct impingement. [31]
- Osteotomy to correct angular deformity.
- Prosthetic joint replacement for severe disease involving a major joint (knee, hip, shoulder, elbow). [32]
- Elbow synovectomy with radial head excision. [33]
- Arthrodesis of the ankle, which provides excellent pain relief and correction of deformity with marked improvement in function. Recent improvements in ankle replacement surgery may pose an alternative for persons with hemophilia in the future. [34,35].

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Surgery for Advanced Hemophilic Arthropathy

- Knee 54%
- Hip 14%
- Ankle 14%
- Elbow 14%
- Shoulder 4%
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Capsular Releases
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Total Knee Replacement

- Pain relief
- Decrease in disability
- Increase in ROM
- Improvement in quality of life
## Common and New Orthopaedic/PT Recommendations

### Outcome of TKR in Hemophilia

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th># Knees</th>
<th>F/U (years)</th>
<th>Infection</th>
<th>Other Complications</th>
<th>Clinical Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goddard et al</td>
<td>2010</td>
<td>70</td>
<td>9.2</td>
<td>1.40%</td>
<td>DVT: 2/70</td>
<td>95% 5% 0%</td>
</tr>
<tr>
<td>Silva and Luck</td>
<td>2005</td>
<td>90</td>
<td>8</td>
<td>16%</td>
<td>-</td>
<td>80% 13% 7%</td>
</tr>
<tr>
<td>Norian et al.</td>
<td>2002</td>
<td>53</td>
<td>9.2</td>
<td>13%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cohen et al.</td>
<td>2000</td>
<td>21</td>
<td>5.6</td>
<td>10%</td>
<td>Patellar dislocation: 1/21</td>
<td>68% 26% 6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Arthrofibrosis: 2/21</td>
<td></td>
</tr>
<tr>
<td>Thomason et al</td>
<td>1999</td>
<td>23</td>
<td>7.5</td>
<td>17%</td>
<td>Hemarthrosis: 3/23</td>
<td>17% 9% 74%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nerve Palsy: 1/23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Loosening: 2/23</td>
<td></td>
</tr>
<tr>
<td>Heeg et al.</td>
<td>1998</td>
<td>9</td>
<td>6.6</td>
<td>0%</td>
<td>Loosening: 1/9</td>
<td>78% 11% 11%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hemarthrosis: 1/9</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stiffness: 2/9</td>
<td></td>
</tr>
<tr>
<td>Unger et al.</td>
<td>1995</td>
<td>26</td>
<td>6.4</td>
<td>0%</td>
<td>Hemarthrosis: 2/26</td>
<td>92% 8% 0%</td>
</tr>
<tr>
<td>Teigland et al.</td>
<td>1993</td>
<td>15</td>
<td>7</td>
<td>10%</td>
<td>Hemarthrosis: 1/10</td>
<td>-</td>
</tr>
<tr>
<td>Kjaersgaard-Andersen et al.</td>
<td>1990</td>
<td>12</td>
<td>3.6</td>
<td>0%</td>
<td>Hemarthrosis: 4/12</td>
<td>100% 0% 0%</td>
</tr>
</tbody>
</table>
Common and New Orthopaedic/PT Recommendations

TKR in Hemophilia: Special Considerations

- High-efficiency particulate air (HEPA)-filtered suits
- No antithrombotic prophylaxis
- Longer hospital stay
- Extensive physical therapy (up to 9 weeks)
Common and New Orthopaedic/PT Recommendations

TKR in Hemophilia: Survival

Kaplan-Meier survival estimate

End Point: Mechanical Failure
End Point: Component Removal

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of knees at risk</th>
<th>Survival</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>100%</td>
<td>95-100%</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td>90.8%</td>
<td>84-97%</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>82.7%</td>
<td>71-91%</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>82.7%</td>
<td>62-91%</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>82.7%</td>
<td>50-91%</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>82.7%</td>
<td>17-91%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of knees at risk</th>
<th>Survival</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td>96.0%</td>
<td>91-100%</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>96.0%</td>
<td>90-100%</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>96.0%</td>
<td>85-100%</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>96.0%</td>
<td>78-100%</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>96.0%</td>
<td>60-100%</td>
</tr>
</tbody>
</table>

Silva, M. and Luck, J.V., JBJS, 2005
Common and New Orthopaedic/PT Recommendations

TKR in Hemophilia: Outcome

**KS-Clinical Score**  

<table>
<thead>
<tr>
<th>Score Description</th>
<th>% of Knees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent (85-100)</td>
<td>53%</td>
</tr>
<tr>
<td>Good (70-84)</td>
<td>27%</td>
</tr>
<tr>
<td>Fair (60-69)</td>
<td>13%</td>
</tr>
<tr>
<td>Poor (&lt;60)</td>
<td>7%</td>
</tr>
</tbody>
</table>

**KS-Clinical Score Points (Ave)**

- **Pain**: 48 (45-50)
- **Range of Motion**: 15 (0-23)
- **Stability**: 24 (15-25)
- **Deductions**: 7 (0-20)
Common and New Orthopaedic/PT Recommendations

TKR in Hemophilia: Infection Prophylaxis

- Meticulous antisepsis with self-infusion
- Regular medical check-ups
- Immediate reporting of any type of infection
- Prophylactic antibiotic prior to dental work or any other contaminated procedure
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy

- Second most frequently affected joint in hemophilia
- Chronic hemophilic synovitis usually leads to the enlargement of the radial head
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Severe Arthropyathy

Normal Joint  Acute Bleeding  Chronic Synovitis  Early Arthritis  End Stage Arthritis

What to do??
Supination

Pronation

Mechanical blockage for rotation

Synovial tissue

Pain

Hemophilia

Impingement

Elbow Arthropathy: Radial Head Excision
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision

- Mechanical blockage
- Impingement sites
- Arthritic joint
Radial Head Excision and Synovectomy in Patients with Hemophilia

By Mauricio Silva, MD, and James V. Luck Jr., MD

Investigation performed at the Hemophilia Treatment Center, Orthopaedic Hospital, Los Angeles, California

J Bone Joint Surg Am. 2007;89:2156-62

- 1969 - 2004
- 42 radial head excisions
- 37 patients
- Mean follow-up: 6 years (1 - 28)
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision

No early or late post-operative infections

Post-operative Pain

<table>
<thead>
<tr>
<th>Severity</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision

Flexion – Extension

- Pre-op
- Post-op
- Latest F/U

2.5° p=0.1
3.4° p=0.2
1.8° p=0.6
0.4° p=0.8
2.9° p=0.3
5.2° p=0.3
Elbow Arthropathy: Radial Head Excision

Pronation – Supination

Common and New Orthopaedic/PT Recommendations
Common and New Orthopaedic/PT Recommendations

Elbow Arthropathy: Radial Head Excision
## Common and New Orthopaedic/PT Recommendations

### Elbow Arthropathy: Arthroplasty

- 19 combined TEA

<table>
<thead>
<tr>
<th>Author</th>
<th># Elbows</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Ulnar neuropathy</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Axillary vein thrombosis</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Persistent pain</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

---

**Hemophilic Arthropathy of the Elbow Treated by Total Elbow Replacement**

A CASE SERIES

By Sheikd Kammelen, FRCS(Orth), Robert A. Adams, MA, RPA, Shawn W. O'Driscoll, MD, PhD, and Bernard P. Morrey, MD

Investigation performed at the Department of Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota

*The Journal of Bone & Joint Surgery - 1315.org*

*Volume 86-A - Number 3 - March 2004*
Common and New Orthopaedic/PT Recommendations

Ankle Arthropathy

- 3rd most commonly affected joint
- Onset when children start to walk
- In severe hemophilia, advanced ankle arthropathy is common by early adulthood
Common and New Orthopaedic/PT Recommendations

Ankle Arthropathy: Arthroplasty

- Minimal experience in hemophilia
- n=11
- Pain relief
- Patient satisfaction
- High risk of infection (20%)
- Lack of long-term results
Ankle Arthropathy: Arthrodesis

- Tibio-talar
- Tibio-talar + Sub-talar
- Sub-talar

The patient will retain some degree of dorsi-plantar flexion at the mid-foot joints.
1971 - 2004
39 arthrodesis (30 patients)
Pain (100%)
Mean F/U: 4.3 years (1-16)
Mean age: 36 years (18-60)
Common and New Orthopaedic/PT Recommendations

Ankle Arthropathy: Arthrodesis

No intra-operative or immediate post-operative complications

- Two late infections (5%)
  - Pin-site infection
  - BK amputation due to distal tibia osteomyelitis

1970
Severe arthropathy TT joint

1971
TT joint fusion (Casted)

1975
Non-union TT fusion

1981
Electric stimulation

1981
Tibial osteomyelitis
Common and New Orthopaedic/PT Recommendations

Ankle Arthropathy: Arthrodesis

- Non-union
  - 20% TT
  - 27% ST
- Non-painful

- Before 1995
  - 27% TT
  - 50% ST
- After 1995
  - 11% TT
  - 22% ST
Iliopsoas Hemorrhage

- Type of muscle hemorrhage with unique presentation.
- Signs may include pain in the lower abdomen, groin, lower back and pain on extension, but not on rotation, of the hip joint.
- There may be paresthesia in the medial aspect of the thigh or other signs of femoral nerve compression such as loss of patellar reflex and quadriceps weakness.
- The symptoms may mimic acute appendicitis, including a positive Blumberg’s sign.
- Type of muscle hemorrhage with unique presentation.
- Signs may include pain in the lower abdomen, groin, lower back and pain on extension, but not on rotation, of the hip joint.
- There may be paresthesia in the medial aspect of the thigh or other signs of femoral nerve compression such as loss of patellar reflex and quadriceps weakness.
- The symptoms may mimic acute appendicitis, including a positive Blumberg’s sign.

- Immediately raise the patient’s factor level.
- Maintain the levels for 5–7 days or longer, as symptoms indicate (refer to Tables 7-1 and 7-2).
- (Level 4) [20–22]

A 6-week course of treatment with factor is recommended, followed by repeat MRI. If the tumor is decreasing, continue with factor and repeat MRI for three cycles. (Level 4) [42,43]

Severe Hemophilia A and B
Percentage of Patients on Continuous Prophylaxis

The Universal Data Collection Program, March 2004

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5</td>
<td>436</td>
<td>200 (45.9)</td>
</tr>
<tr>
<td>6-10</td>
<td>804</td>
<td>450 (56.0)</td>
</tr>
</tbody>
</table>

RCT’s on continuous prophylaxis


✓ Decreased number of joint bleeds

✓ Better joint scores

✓ Effective reduction in hemophilic arthropathy
No further need of joint surgery for hemophiliacs?

- Inhibitor development
- Fewer number of cases
- New challenges
- Higher risk of intraoperative and postoperative complications
Intra-articular injections of hyaluronic acid induce positive clinical effects in knees of patients affected by haemophilic arthropathy.

Carulli C¹, Matassi F, Civinini R, Morfini M, Tani M, Innocenti M

- 27 hemophilic patients
- Two cycles of injections
- VAS, SF-36, WFH, Pettersson score, WOMAC
- 7 years follow-up
- Improvement in pain and functional recovery
- Few patients required TKR for persistent pain
Common and New Orthopaedic/PT Recommendations

FAQ – I Do Not Know The Answer!!!
The efficacy of platelet-rich plasma in the treatment of symptomatic knee osteoarthritis: a systematic review with quantitative synthesis.

Khoshbin A1, Leroux T, Wasserstein D, Marks P, Theodoropoulou J, Ogilvie-Harris D, Gandhi R, Takhar K, Lum O, Chahal J.

Abstract

PURPOSE: The purpose of this systematic review was to synthesize the available Level I and Level II literature on platelet-rich plasma (PRP) as a therapeutic intervention in the management of symptomatic knee osteoarthritis (OA).

METHODS: A systematic review of Medline, Embase, Cochrane Central Register of Controlled Trials, PubMed, and www.clinicaltrials.gov was performed to identify all randomized controlled trials and prospective cohort studies that evaluated the clinical efficacy of PRP versus a control injection for knee OA. A random-effects model was used to evaluate the therapeutic effect of PRP at 24 weeks by use of validated outcome measures (Western Ontario and McMaster Universities Arthritis Index, visual analog scale for pain, International Knee Documentation Committee Subjective Knee Evaluation Form, and overall patient satisfaction).

RESULTS: Six Level I and II studies satisfied our inclusion criteria (4 randomized controlled trials and 2 prospective nonrandomized studies). A total of 577 patients were included, with 264 patients (45.8%) in the treatment group (PRP) and 313 patients (54.2%) in the control group (hyaluronic acid [HA] or normal saline solution [NS]). The mean age of patients receiving PRP was 56.1 years (51.5% male patients) compared with 57.1 years (49.5% male patients) for the group receiving HA or NS. Pooled results using the Western Ontario and McMaster Universities Arthritis Index scale (4 studies) showed that PRP was significantly better than HA or NS injections (mean difference, -18.0 [95% confidence interval, -28.8 to -8.3]; P < .001). Similarly, the International Knee Documentation Committee scores (3 studies) favored PRP as a treatment modality (mean difference, 7.9 [95% confidence interval, 3.7 to 12.1]; P < .001). There was no difference in the pooled results for visual analog scale score or overall patient satisfaction. Adverse events occurred more frequently in patients treated with PRP than in those treated with HA/placebo (8.4% v 3.8%, P = .002).

CONCLUSIONS: As compared with HA or NS injection, multiple sequential intra-articular PRP injections may have beneficial effects in the treatment of adult patients with mild to moderate knee OA at approximately 6 months. There appears to be an increased incidence of nonspecific adverse events among patients treated with PRP.

LEVEL OF EVIDENCE: Level II, systematic review of Level I and II studies.
Common and New Orthopaedic/PT Recommendations

Take Home Message

- Aggressive treatment of acute hemarthrosis in patients without arthritic changes
- PT for increase in ROM and prevention of contractures
- If chronic hemarthrosis: RS
- TKR: excellent choice but beware of risk of infection
- Radial head excision for advance elbow arthropathy
- Ankle arthrodesis
Common and New Orthopaedic/PT Recommendations

WFH GUIDELINES
Guidelines for the management of hemophilia

Hemophilia Journal

WFH Website
¡Thank you!

msilva@mednet.ucla.edu