Orthopaedics
and Traumatology
2 (1993), 104–106 (No. 2), © Urban & Vogel, Munich

Arthroscopic Lavage for Joint Infections

André Gaechter

Department of Orthopaedic Surgery
University Hospital Basel, Switzerland

Surgical Principles

"The joint itself defends best against infection." The synovial membrane has a great potential in preventing and controlling infections.

The joint should not remain open. A primary synovectomy should be avoided [4]. Repeated arthroscopic irrigation follows these guidelines and has a high success rate in eradicating infection and restoring joint mobility. In addition antibiotics are mandatory.

The following recommendations are based on a series of 98 infected joints treated by arthroscopic lavage.

Advantages

Non-traumatic.

Useful already when infection is suspected.

The synovial membrane with its immunologic potential is being preserved. The different compartments of the joint can be irrigated selectively and under direct vision.

Can be performed under local anaesthesia (for knee, wrist, elbow, ankle).

Day-care procedure.

Early rehabilitation.

Less adhesions and joint stiffness.

Faster recovery [1–3, 5, 6].

Disadvantages

Not suitable for very small joints (finger, etc.).

Not advisable in stages III and IV.

Revised Version from: Operat. Orthop. Traumatol. 1 (1989), 196–199 (German Edition).

Arthroscopic Classification of Joint Infection
(Gaechter [2, 3])

Stage I:	Synovitis, turbid fluid Possible petechiae
Stage II:	Fibrin clots, franc pus
Stage III:	Thickening of the synovial membrane (up to several centimetres) Multiple pouches due to adhesions
Stage IV:	Pannus. Aggressive synovitis Radiographically visible changes Subchondral erosions

Indications

Joint infection stage I and II.

Exceptionally stage III (use shaver).

Acute infection after joint replacement (no radiologic changes).

Contraindications

Life threatening infection (i. e. anthrax).

Phlegmon.

Joint infection stage IV (with osseous involvement).

Patient Information

Shoulder: Possibility of damage to the neural structures (due to traction). Subacromial space should be included in lavage.

Elbow: Radial approach: close relation to radial or median nerve. Even injury of brachial artery possible.

Hip: Anterior approach: neurovascular bundle should be avoided. When using traction table chance of pressure sores, chance of impotence due to compression of pudendal nerve.

Knee: When using anterior approach nervous or vascular damage unlikely.

Ankle: Injury to tibial artery, tibial nerve or branches of fibularis nerve possible.

In all joints: If these measures are unsuccessful: synovectomy, removal of implant components or other foreign material, or arthrodesis when necessary.

Pre-operative Work-up

All important laboratory tests relating to infections must be ordered: sed. rate, c-reactive protein, WBC, differential, tuberculosis.

Vaccum tubes for cell counts must be available, as well as swabs for aerobic and anaerobic cultures and sensitivity tests, and GRAM stains.

Surgical Instruments

- Arthroscope (5 mm).
- Inflow canula.
- Irrigation solutions (5 to 10 l Ringer's lactate).
- Shaver.
- Biopsy forceps.

Positioning and Anaesthesia

- Shoulder: Lateral position on opposite side, posterior approach.
- Elbow: Radial approach.
- Hip: Supine position, lateral or antero-lateral approach. Traction table not needed.
- Knee: Supine, antero-lateral approach.
- Ankle: Supine, knee on knee support, anterior approach.
- Free draping of all involved joints.
- Irrigation of very painful joints as well as of shoulder and hip: the lavage should be done under general anaesthesia.
- Local anaesthesia may be recommended for repeated lavage of smaller joints (knee, ankle).

Local anaesthesia:

- Portals infiltrated with Lidocain, Marcain etc.
- Then draining of intraarticular fluid for culture and sensitivity testing.
- Intraarticular anaesthesia with 10 to 20 cc of Marcain (0.25 or 0.5 %).

Surgical Technique

Lavage and irrigation fluids.

Depending on the size of the joint 3 to 10 l of Ringer's solution is being used.

An inflow canula is recommended. Outflow should go through the trocar or through the shaver sleeve to allow evacuation of clots. The different compartments have to be irrigated under direct vision.

Biopsy if necessary.

After taking samples for cultures the intravenous treatment with a specific antibiotic should be started.

Disinfectants should never be used on cartilage tissue (cartilage destruction possible!). The effect of antibiotics in the irrigation solution is very doubtful, their use is not recommended.

Therapy:

For repeat procedures the same portals can be used.

Stage I and II: Single or repeat irrigation plus systemic antibiotics. Shaver might be helpful.

Stage III: In addition use of shaver for extensive debridement is mandatory. A complete synovectomy is advisable.

Stage IV: Contraindicated for arthroscopic lavage as a single procedure.

Postoperative Management

Permanent drainage should be avoided.

Continuous passive motion is recommended.

Elevation of the limb, local ice application.

Intravenous antibiotics at least for three to ten days.

Arthroscopic lavage should be repeated if effusion recurs and if pain and inflammatory reactions increase (fever, increased WBC). The antibiotic treatment should be continued up to three months until c-reactive proteins, leucocytes and sedimentation rate have returned to normal levels.

Special remarks:

In the case of an infected implant a disinfectant may be used. Don't scratch the implant surfaces with the instruments [7].

Intra- and Post-operative Complications

They are the same as for any other arthroscopic procedure.

Errors and Potential Hazards

Systematic antibiotics administrated for too short period or in inadequate amounts.

Insufficient quantity of irrigation fluid.

Not all compartments have been reached and irrigated.

Infected Baker Cyst.

Disinfectant agents might destroy the cartilage.

Results

In the period from 1978 to 1986 61 joints were treated by arthroscopic lavage and systemic antibiotics (four shoulders, one hip, three ankles, 53 knees).

The causes of the infections were haematogenous or iatrogenic (steroids, postoperative).

In 21 patients additional risk factors were noted (diabetes, steroid treatment, immunosuppressives, heroin or alcohol abuses, pancreatitis, crystalline synovitis, implants).

Age: ten to 89 years. Most infections occurred in the fifth decade.

Bacterial growth in the joint fluid was detected in 67 % of the patients, 7.5 % had a positive blood culture.

Bacteria found: Staph. aureus, Staph. albus, Staph. epidermidis, Streptococci, Proteus, Citrobacter, Salmonella Dublin. With one to three arthroscopic lavages most of the infections were treated successfully. In 11.5 % of the patients the lavage was not effective: three times additional synovectomy was necessary (stage III to IV), twice removal of implants had to be done.

In all successfully treated patients the joint mobility reached 85 % to 100 % of a normal joint.

From 1987 to 1989 an additional 36 infected joints were treated by arthroscopic lavage. In this second series the failure rate dropped to 5 % due to better patient selection (stage I to III).

References

1. Dory, M. A., M. J. Wuatelet: Arthroscopy in septic arthritis. Arthr. and Rheum. 28 (1985), 198–203.
2. Gächter, A.: Der Gelenkinfekt. Inform. Arzt 6 (1985), 35–43.
3. Gächter, A.: Die Bedeutung der Arthroskopie beim Pyarthros. Hefte Unfallheilk. 200 (1988), 132–136.
4. Giebel, G., G. Muhr, H. Tscherne: Die Frühsynovektomie beim Kniegelenksempyem zur Vermeidung der Gelenksteife. Hefte Unfallheilk. 153 (1981), 446.
5. Jarrett, M. P., L. Grossmann, A. H. Sadler, A. Grayzek: The role of arthroscopy in the treatment of septic arthritis. Arthr. and Rheum. 24 (1981), 737–739.
6. Jvey, M., R. Clark: Arthroscopic debridement of the knee for septic arthritis. Clin. Orthop. 199 (1985), 201–206.
7. Müller, K. H., J. Müller-Färber: Die infizierte Knietotalendoprothese. Unfallheilkunde 86 (1983), 236–241.

Key Words:

Joint infection · Arthroscopy · Shaving · Local anaesthesia · Complications in arthroscopy · Septic arthritis · Debridement

Address all correspondence to:
Prof. Dr. André Gaechter
Abteilung für Orthopädische Chirurgie
Universität Basel
Kantonsspital Basel
Spitalstraße 21
CH-4031 Basel
Switzerland