SYNOVIAL FLUID

Purpose

- Analysis of synovial fluid plays a major role in the diagnosis of joint diseases.
- When infective arthritis and crystal-induced synovitis are suspected, examination of the synovial fluid may indicate a definite diagnosis.

contraindications

- There are no absolute contraindications to joint aspiration.
- However, relative contraindications are the presence of
- local sepsis (cellulitis),
- bacteraemia,
- congenital or acquired bleeding tendency.

Collection

- Three samples are collected.
- **First tube:**
- in a sterile tube for microbiological examination;
- **2nd tube**:
- in anticoagulant (heparin or
- EDTA) for microscopic examination;
- **3rd tube**
- third sample is placed in a plain tube and allowed to clot (normal fluid does not clot).

Note

If the specimen cannot be examined immediately, fluid should be frozen and stored at -70°C until examined

Contents

- Physical examination
- Chemical examination
- Microscopic examination

Physical examination

- color
- Appearance
- Amount
- Clot

Microscopic examination

- Cell count
- Differential count
- Crystals examination

Microscopic examination

- WBC x109/L 0-0.2
- Neutrophils (%) <25
- Crystals present NO
- RBCs present No
- Bacteria No

CHEMICAL EXAMINATION

- Protein
- Glucose
- Complement level

Protein

- Normal protein level is one third that of serum,
- with an average of about 2.0 g/dl.
- Level higher than 3.0 g/dl suggest an inflammatory or haemorrhagic exudate

Glucose

- Glucose level of synovial fluid is interpreted

along with plasma level, which is normally equal to or slightly lower than (within 10 mg/dl) the serum leve

Complement level

- C3 and C4 levels in the synovial fluid sometimes suggest a disease.
- In rheumatoid arthritis they are normal or decreased,
- in SLE they are decreased and in Reiter's disease and gout they are raised above serum level

Table 12.5: Classification of Arthritides.

Group I	Group II	Group III	Group IV	Group V
(Noninflammatory)	(Inflammatory)	(Infectious)	(Crystal-induced)	(Haemorrhagic)
Osteoarthrosis	Rheumatoid arthritis	Bacterial	Gout	Traumatic arthritis
Traumatic arthritis	Lupus erythematous	Mycobacterial	CPPD (calcium pyrophosphate dihydrate deposition disease Appetite-associated	Haemophilic arthropathy
Osteochondritis dissecan	Reiter's syndrome	Fungal		Anticoagulation
Osteochondromatosis	Rheumatic fever			Synovial haemangioma
Neuropathic osteo-arthropathy	Ankylosing spondylitis			
Pigmented villo Nodular synovitis	Regional enteritis			
	Ulcerative colitis			
	Psoriasis			

Table 12.6: Synovial fluid findings by disease category.

Findings	Normal	Group I Noninflammatory	Group II Inflammatory	Group III Infectious	Group IV Crystal-induced	Group V Haemorrhagic
Appearance		Yellow, clear or slightly cloudy	Yellow or clear turbid or bloody	Yellow, cloudy, or milky	Yellow, green Yellow or turbid	Red-brown or xanthochromic
WBC $x10^9/L$	0-0.2	0-5	2-200	50-200	0.5-200	0.05-10
Neutrophils (%)	<25	<30	>50	>90	<90	<50
Crystals present	No	No	No	No	Yes	No
RBCs present	No	No	No	Yes	No	Yes
Blood-fluid glucose ratio	0-10	0-10	0-40	20-100	0-80	0-20
Culture	Negative	Negative	Negative	Often Positive	Negative	Negative