

• **SNOK**

# Osteonecrosis knee

*J Am Acad Orthop Surg* 2011;19:

482-494

- 3 distinct pathologic

Secondary ON : 85% require joint replacement by 4 years,

- spontaneous ON : 90% resolves by NWB
  - Postarthroscopic ON.
- 
- Secondary ON frequently progresses to endstage disease, and early surgical intervention is recommended.
  - Initial management of spontaneous ON of the knee and postarthroscopic ON is typically nonsurgical, with observation for
  - clinical or radiographic progression.

# Key Concepts in Knee Osteonecrosis

- The knee is the second most common site of ON.
- Controversy exists regarding whether spontaneous ON of the knee represents insufficiency fracture or part of the progression of osteoarthritis.
- Postarthroscopic ON is associated with subchondral collapse and may be associated with altered knee mechanics.
- MRI is the most sensitive and specific diagnostic tool for all three entities
- Nonsurgical management with analgesics and protected weight bearing is recommended for early-stage spontaneous ON of the knee and postarthroscopic ON, but it may not be appropriate for secondary ON.
- Patients in whom nonsurgical measures are unsuccessful may be treated with joint preserving procedures. Joint arthroplasty is required for persons with subchondral bone collapse.

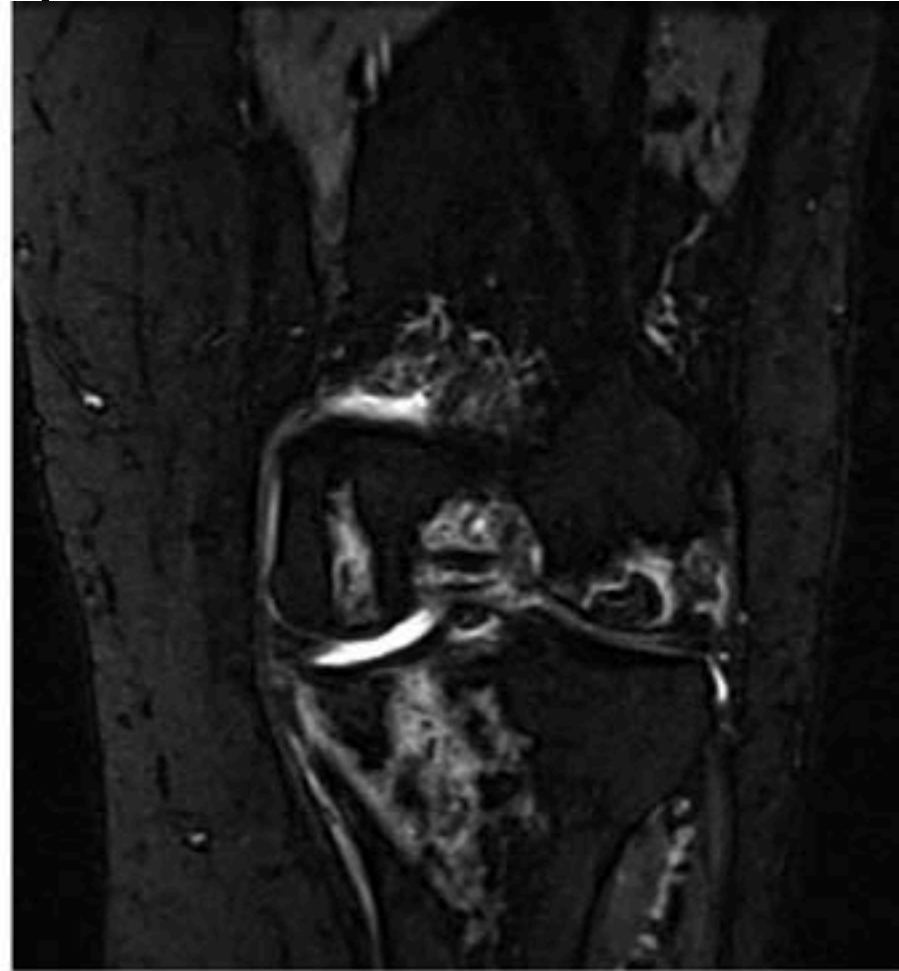
# Spontaneous ON



## II: Alcohol, steroid



A

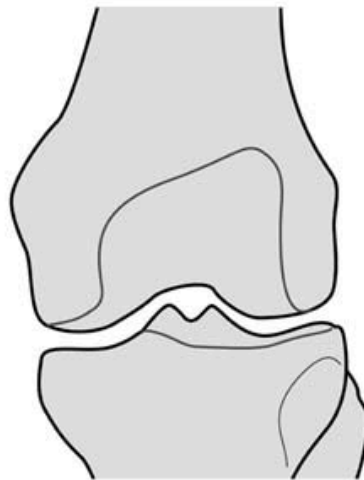


B

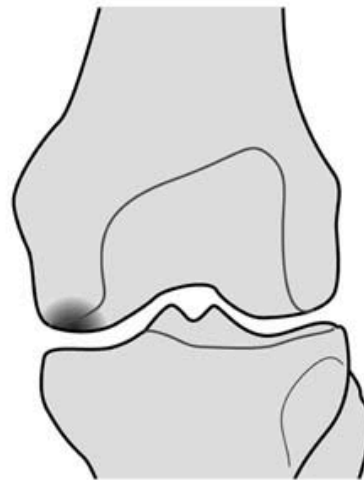
### III Post arthroscopic



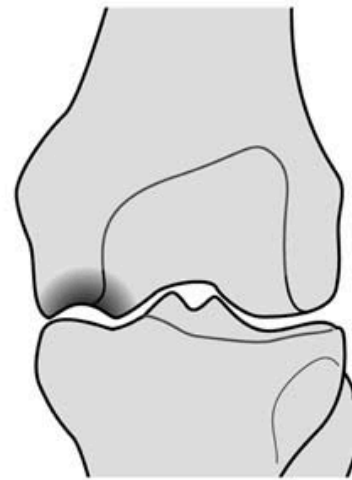
Ficat: III =crescent



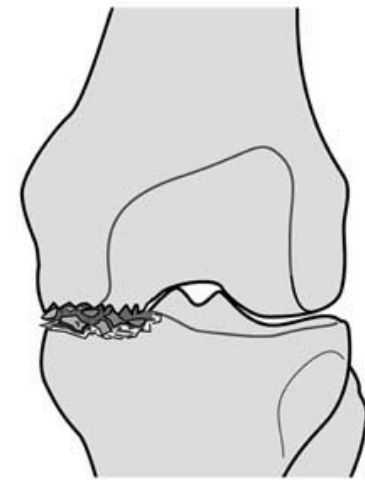
**A** Stage I



**B** Stage II



**C** Stage III



**D** Stage IV

# Post arthroscopic ON

- Currently, no consensus exists as to its pathogenesis
- Incidence: ? 4%
- With UKO: 95% had KSS of  $\geq 80$  points. Mean KSS, 92 points [J Bone Joint Surg Am 2006; 88(suppl 3):69-75.]
- Abnormal loading leading to chondral injury
- Abnormal loading leading to microfracture and abnormal blood circulation
- Direct thermal or hotoacoustic injury via laser or radiofrequency
- Most reported cases of postarthroscopic ON occur at the medial femoral condyle
- Patients should have no evidence of bone marrow edema preoperatively.

# SONK following arthroscopy

- ~4% of arthroscopy
- Sites:
  - Most reported cases of postarthroscopic ON occur at the medial femoral condyle.
  - The lateral femoral condyle is the second most frequently affected site.
  - In rare cases, the lateral tibial plateau, medial tibial plateau, or patella is affected.
- Postarthroscopic ON has no age or sex bias, and the lesion is typically localized to the compartment in which the surgery was performed.
- In one study, patients presented with sudden-onset pain approximately 24 weeks following arthroscopy (range, 4 to 92 weeks).<sup>39</sup> Pain early in the recovery period may be mistaken as normal postoperative healing.
- MRI as well as AP and lateral radiographs are recommended in patients with suspected postarthroscopic



# Associated Risk Factors

- Developed following arthroscopy performed with mechanical surgical instruments only, and it was suggested that occult damage was caused to the cartilage and meniscus.
- Subchondral fracture characterized by disruption of the trabecular architecture but without ON. These findings were similar to pathology seen in persons with spontaneous ON of the knee.<sup>49</sup>
- ON following radiofrequency or laser-assisted arthroscopic surgery was initially believed to be related to a different pathogenesis.
- Currently, no consensus exists as to its pathogenesis.

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Age	Typically <45 years	≥50 years	Any
Sex	More likely in men than women	Female-to-male ratio of 3:1	No predilection
Bilaterality	>80%	<5%	Never
Other joint involvement	>90% (hip, shoulder, ankle)	No	No
Associated risk factors	Direct causes: trauma, caisson disease, chemotherapy, Gaucher disease, radiation. Indirect causes: alcohol abuse, coagulation abnormalities (thrombophilia, hypofibrinolysis), corticosteroid use, inflammatory bowel disease, organ transplant, systemic lupus erythematosus, smoking.	Idiopathic, chronic mechanical stress, or microtrauma	Meniscectomy, cartilage débridement, anterior cruciate ligament reconstruction, laser or radiofrequency-assisted surgery
Proposed pathogenic mechanisms	Direct cell injury Restriction or occlusion of blood supply Increased intraosseous pressure	Weight-bearing articular surface subjected to altered stresses as the result of subchondral fracture Vascular compromise to subchondral bone, resulting in osseous ischemia and subsequent edema Osteoarthritis variant	Abnormal loading leading to chondral injury, inflammation, edema, and intraosseous pressure Abnormal loading leading to microfracture and abnormal blood circulation Direct thermal or photoacoustic injury via laser or radiofrequency-assisted arthroscopy
Pathologic findings	Necrotic bone	Fibrotic bone, healing fracture, osteopenia, osteoarthritis, necrosis	Fibrotic bone and healing fracture. Necrotic bone after direct thermal