

Patient Information Sheet

KNEE OSTEOARTHRITIS

Structure

The knee lies between the thigh bone (*femur*), leg bone (*tibia*) and knee-cap (*patella*). Covering the ends of the bones is a tough low friction surface (*articular cartilage*). Two spacer washers (*menisci*) transfer load from the femur to the tibia. The knee consists of two joints: the thigh / leg (*tibio-femoral*) and the thigh / knee-cap (*patello-femoral*). These joints are stabilised by ligaments: the collaterals (*inner / medial & outer / lateral*) prevent side-to-side movement and the cruciates (*anterior / front & posterior / back*) prevent twisting (*rotational*) movement. The knee is straightened (*extended*) by thigh muscles (*quadriceps*) and bent (*flexed*) by hamstring muscles.

Function

Articular cartilage consists of cells (*chondrocytes*) that produce fibres (*collagen*) and a gel. The fibre-gel is known as the *matrix*. This gel consists of large negatively charged molecules (*proteoglycans*) that attract positively charged water ions to 'blow up' (*hydrate*) the gel. This fibre-reinforced composite gel efficiently resists compression and provides an almost frictionless gliding surface for movement.

Biochemically, large proteoglycan molecules consist of a hyaluronic acid backbone with proteoglycan monomer side chains. Hyaluronic acid contains *glucosamine* whilst proteoglycan monomers contain *chondroitin* sulphate. Glucosamine and chondroitin are two 'building blocks' of articular cartilage which is why they are used in some arthritis medications.

Failure

The ability of the knee joint to efficiently transfer load to the ground is determined by the quality of the matrix produced by chondrocytes. Young normal chondrocytes produce high quality matrix that easily transfers load without damaging the joint surface. However, older or injured chondrocytes produce lower quality matrix that may be damaged with normal knee use. This causes cartilage surface "wear and tear" resulting in degenerative joint disease (also called osteoarthritis or OA). OA is classified as primary age-related or secondary post-traumatic. Primary (or constitutional) OA is part of the normal aging process and begins in the 40s. Secondary OA results from a joint injury or fracture resulting in a "step" in the normally smooth joint surface which rapidly wears out with normal knee use.

Diagnosis

OA is diagnosed by the history of a gradual onset of pain often persisting at night. Symptoms include swelling, stiffness and reduced walking ability. Examination indicates a painful walking pattern (*antalgic gait*), joint tenderness, swelling and a restricted range of motion. X-ray shows reduced joint space with bone overgrowth (*osteophytes*), hardening (*sclerosis*) and cyst formation.

Management

Initially a trial of activity modification, weight loss, walking aid use, physiotherapy, anti-inflammatory medication and glucosamine is undertaken. Once non-operative management has failed arthroscopy, limb realignment (*osteotomy*), partial or total joint replacement (*arthroplasty*) is performed.

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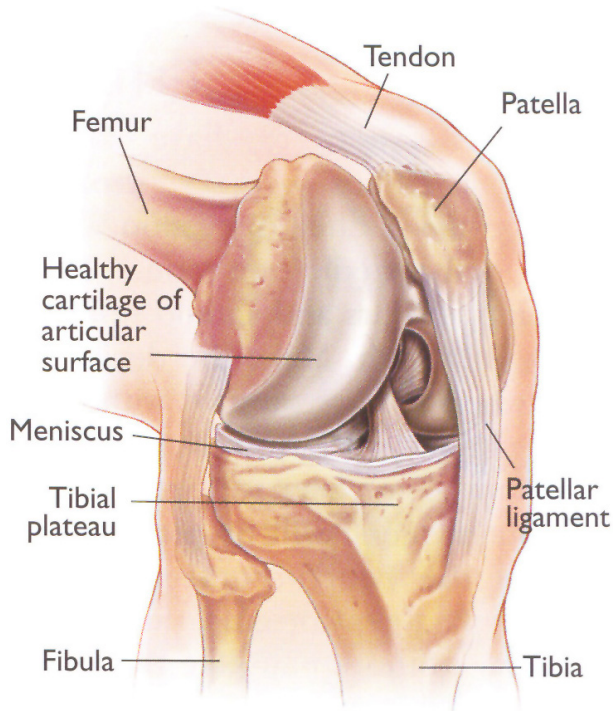
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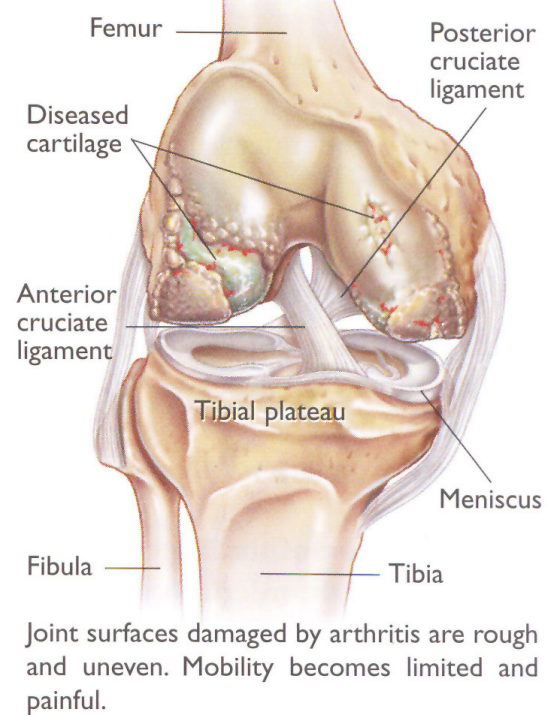
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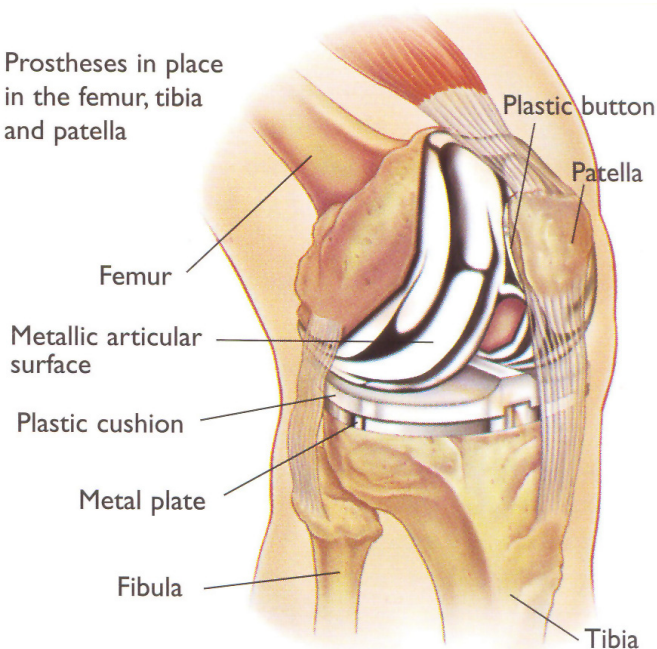
NORMAL KNEE JOINT



DISEASED KNEE JOINT



Prostheses in place in the femur, tibia and patella



The artificial knee joint is designed to move and function like a natural knee joint. Although the artificial joint is strong and flexible, it is not as strong and flexible as the natural joint.

