

How I do a Maquet Osteotomy?

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Which treatment?



And if the patient is young?!

Maquet: 1963

- ✓ Anterior displacement of the tibial tuberosity design to reduce the joint reactive force in the patellofemoral joint




Mihalko et al. 2007

Maquet: 1963

- ✓ Biomechanically, this is achieved by increasing the level arm of the quadriceps muscle and by increasing the angle β formed by the vectors of the quadriceps muscle and the patella tendon

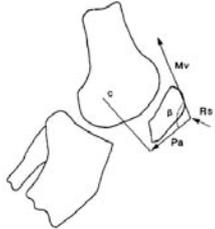


FIG. 1. A diagram of the patellofemoral joint mechanics. Mv = quadriceps force; Pa = patellar tendon force; C = patellar tendon lever arm; β = angle of application for quadriceps; Rs = resultant patellofemoral force.

Maquet: 1963

- ✓ Recommendation of a 2.0 to 2.5 cm advancement based on geometrical calculations that suggested a 50% of reduction in the compressive patellofemoral force could be achieved

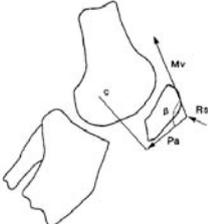
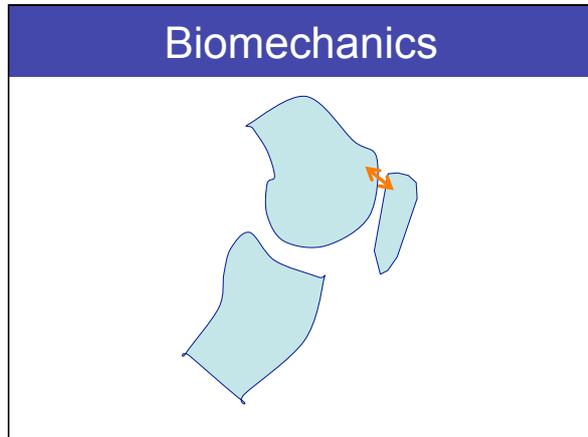
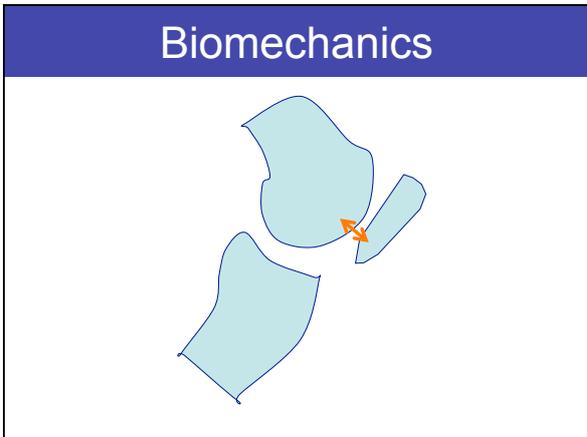


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Biomechanics

Ferguson 1979

- ✓ Implantation of stress transducers in the retropatellar of amputation specimens.
- ✓ A point of diminishing returns is encountered after 1.25 cm of elevation.
- ✓ He recognized some potentially deleterious effects of increasing elevation due to the transfer of stress to the proximal pole of the patella



Biomechanics

- ✓ Ferrandez et al: elevation of the tibial tuberosity can paradoxically increase stresses on the proximal portion of the patella, particularly when it is elevated >1 cm
- ✓ Using in vitro measurements, both Nakamura et al. and Ferrandez et al. found an elevation of >1 cm to be counterproductive with regard to patellofemoral stresses.

Technique of Maquet O.

- ✓ Lateral parapatellar incision extended past to the tubercle.
- ✓ A 2.5 cm by 5 cm section of iliac crest is then harvested

Technique of Maquet O.

- ✓ Osteotomy is performed with use of a thin oscillating saw blade 8 cm from the superior aspect of the tubercle distally in the coronal plane

Technique of Maquet O.

- ✓ Once mobilized, the proximal segment is displaced anteriorly, allowing plastic deformation of the bone at the distal attachment
- ✓ The iliac crest graft is then fashioned to allow anteriorization at the tubercle

Radin, 1986

Technique of Maquet O.

- ✓ a cancellous screw can be utilized for supplemental fixation through the tubercle and the graft, into the metaphyseal aspect of the tibia.



variations



Herrenbruck

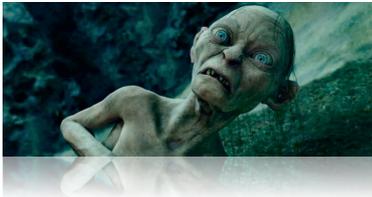
Technique of Maquet O.

- ✓ Full weight-bearing is allowed with protection of a rigid sling
- ✓ Sling during 6 weeks



Question

- ✓ Why I don't perform Maquet Osteotomy anymore?!!



Results?

- ✓ Maquet reported data (average follow-up period, 4.7 years) on 39 patients who had undergone his procedure. Thirty-seven of the 39 patients had good to excellent results, this implied relief of pain and a functional knee.



Results?

- ✓ Jenny et al. evaluated sixty-five patients who had undergone a Maquet procedure for a variety of conditions and found that the forty-eight patients with patellofemoral arthritis had the best results at an average of eleven years.



Results?

- ✓ Engebretsen et al. reported on thirty-eight patients treated with the Maquet procedure. Of thirty-three patients who were available for follow-up at a mean of five years, **ten had improvement, seventeen had no change, and six were worse off.** The patients with improvement were noted to have "Grade III and IV" cartilage changes primarily involving the lateral facet.

➔ Numerous articles reporting poor long-term outcome and an alarming incidence of **serious complications**

Complications

- ✓ Complication rates of 10% to 40%
- ✓ including tibial nonunion, tibial fracture, loss of fixation, **skin necrosis, wound complication, infection, compartment syndrome, deep venous thrombosis**

Wound complications

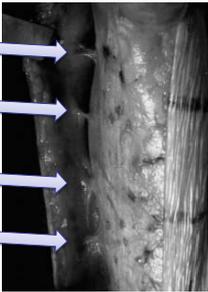
Wound complication reported after Maquet osteotomy

Study	Year	No. of cases	Wound complication rates (%)
Maquet [2]	1976	41	12
Hirsh and Reddy [7]	1979	9	11
Heller et al. [8]	1982	20	10
Mendes et al. [9]	1986	27	37
Siegel [10]	1987	20	25
Radin [11]	1986	36	13

A review of wound healing following Maquet osteotomy
 S.S. Kadambande*, J. Anjeyan, A. Ghandour, W. Mintow-Czyz
Department of Orthopaedics, Royal General Hospital, Newport NP23 2JH, UK
 The Knee 11 (2004) 463–467

Anatomical considerations

- ✓ The cutaneous vascular supply of the lower leg is derived chiefly from the anterior tibial, the posterior tibial and the peroneal arteries
- ✓ Tension of the bone on the skin



Lateral and medial feeding vessels

Anatomical considerations

- ✓ Colombel et al. showed an increased risk of infection due to oedema consequent on disturbed lymph drainage in long anteromedial incisions



Anatomical considerations

- ✓ “an anterolateral incision avoids major damage to the lymphatic drainage of the leg and offers the potential for reduced oedema and skin edge compromise by comparison with an anteromedial incision”.



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So, which technique?

- ✓ Fulkerson (1983) combined the theoretical advantages of both the Maquet anteriorization procedure (to decrease patellofemoral forces) and medialization (to improve joint congruity = **AMZ (anteromedialization)** achieved this by an oblique cut between the sagittal and coronal planes



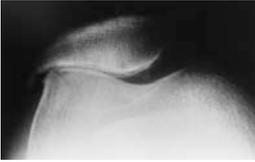


Advantages

- ✓ The procedure had fewer complications than the Maquet and did not require iliac bone graft harvest
- ✓ Reports have described satisfactory results in more than two-thirds of patients at five years after the surgery

Advantages

- ✓ The most common areas involved in patients are the lateral and distal articular regions
- ✓ Anterior and medial transfer of the tibial tubercle would thus be appropriate in these patients



Advantages

- ✓ Using similar logic, with reversal of the oblique cut, it is possible to perform an anterolateralization in case of iatrogenic medial pain and degeneration

