Unicompartmental Arthroplasty of the Knee with the Cemented MOD3™ Prosthesis

A Prospective Study

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Abstract: A consecutive prospective series of 19 knees had unicompartmental arthroplasty between 1991 and 1992 for gonarthrosis and AVN. The MOD3™ prosthesis was used in all cases. A total follow-up evaluation was undertaken after 6 to 7.5 years (mean 6.5 years) in 18 patients (1 patient has died during the observation period). Complications included 1 technical failure, 2 cases of thromboembolic phenomena and 1 case of a late deep infection. Knee score averaged 84.3 (pre-operative 54.7) and functional score averaged 68.9 (pre-operative 34.6). There were no cases with aseptic loosening of the prosthesis.

It is concluded that with the appropriate indications, the unicompartmental arthroplasty of the knee is an effective and predictable procedure to achieve pain reduction and improved quality of life in patients with monocompartmental arthritis. Furthermore, the cemented MOD3™ prosthesis yields results that are comparable to other unicompartmental prostheses in current use.

Key Words: Unicondylar arthroplasty · Unicompartmental arthroplasty · Hemi-arthroplasty of the knee · Monocompartmental gonarthrosis

Unikompartimenteller Kniegelenkersatz mit zementierter MOD3™-Prothese


Die Untersuchungsergebnisse legen nahe, daß bei regelrechter Indikation der unikompartimentelle Kniegelenkersatz ein effektives und vorhersehbares Verfahren zur Schmerzlinderung und Verbesserung der Lebensqualität darstellt. Darüber hinaus sind die Ergebnisse mit der zementierten MOD3™-Prothese vergleichbar mit anderen derzeit verwendeten unikompartimentellen Prothesen.

Schlüsselwörter: Unikondylärer Gelenkersatz · Unikompartimenteller Gelenkersatz · Monokompartimentelle Arthrose · Gonarthrose · Endoprothese
Surgical intervention in the early stages of osteoarthritis of the knee, when the disease process is still confined to 1 compartment only (medial or lateral), consists of 1 of 2 possible procedures: If the gonarthrosis is associated with a significant angulatory joint deformity (usually of the varus type), a realignment procedure such as high tibial osteotomy may be considered in an attempt to alter the biomechanics of the knee joint by lowering the loads in the affected compartment. The second option is the unicompartmental arthroplasty which consists of replacing the cartilage and subchondral bone of both femoral condyle and tibial plateau in 1 compartment only by a small unconstrained prosthesis that has 2 components: a metallic femoral part shaped in the contour of the condyle and a polyethylene tibial tray with or without metal backing [16, 20].

Indications for unicompartmental arthroplasty include osteoarthritis (either degenerative or posttraumatic) or avascular necrosis of the knee that cause significant pain and functional disability and are confined to 1 compartment only [1, 13, 14, 18, 20]. The ideal patient is non-obese, over 60 years of age and leads a sedentary way of live [12, 14]. Accepted absolute contraindications include infection, systemic diseases such as rheumatoid arthritis or hemophilia, an angulatory deformity (varus or valgus) of more than 20° and an unstable knee (resulting from a significant ligamentous injury and not only to the sinking of the tibial plateau in the affected side due to the arthritic process) [1, 5, 12-14, 20]. Obesity and high functional demands are considered to be relative contraindications since both factors might expose the prosthesis to unusually high loads that might bring about early loosening [13, 14, 18].

This technique which has gained much popularity in the early 70s has many advantages over a total knee replacement: It allows preservation of important anatomical structures such as the cartilage in the unaffected compartments, the cruciate ligaments which not only provide antero-posterior and rotational stability to the knee but are also believed to play a role in the sense of proprioception within the joint [12, 20]. Another benefit is supposed to be the conservation of the subchondral bone stock whose integrity is a major factor in the successful outcome of revision surgery [8, 12, 20]. Moreover, propagation of the disease to the contralateral compartment of the same knee at a later stage does not necessarily have to be treated by conversion to a formal total joint arthroplasty since it is instead possible to perform a second unicompartmental procedure, provided of course that the patello-femoral articulation is not significantly involved [4, 11, 16]. Two additional positive observations were reported: The amount of peri-operative bleeding (and therefore the need for blood replacement) is less than in total knee replacement, and the final range of motion is achieved more rapidly thereby shortening both hospital stay and rehabilitation periods [1, 4, 8, 12, 16].

Kieser et al. [8] have compared infection rates of total knee replacement versus unicompartmental in 514 arthroplasties of the knee of which 2/3 were of the unicompartmental type. The results were striking: zero infections in the unicompartmental as opposed to 2.4% in the total knee replacement group.

Despite these many advantages, unicompartmental arthroplasty is still controversial since reports concerning success rates and complications have not been uniform. Padgett et al. [15] performed 21 cases of revision surgery after a failed unicompartmental prosthesis and were faced with a major osseous defect in 16 of them and many technical difficulties. Gill et al. [6] looked into 60 cases of total knee replacement, half of which followed failed unicompartmental prostheses and the other half following a previous high tibial osteotomy. They pointed out that revision after unicompartmental arthroplasty is a technically demanding procedure with considerable bone loss to deal with. Finally, the knee scores achieved in total knee replacement after high tibial osteotomy were better than those with total knee replacement after a unicompartmental replacement. Jackson et al. [7] in a similar study support the findings about the significant bone loss found at the medial tibial plateau but in their hands the revisions after high tibial osteotomy were more difficult to perform and yielded a very high rate of serious complications including 20% (!) of deep infections. Swank et al. [19] reported a relatively high failure rate (12%) of unicompartmental prostheses at 8 years (on the average) of follow-up. Reasons of failure included progression to pan-arthritis, component failure, component loosening, polyethylene wear and technical errors in more or less equal rates. Similar numbers were reported by Scott et al. [17]: 10% failure at 9 years and climbing drastically to 18% at 11 years. Better results were reported by Capra et al. [2] with a failure rate of 6.25% only at 10 years.