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The UniSpacer™: Correcting Varus Malalignment in Medial Gonarthrosis

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1. Introduction

The most commonly used operative treatments of osteoarthritis of the medial compartment of the knee joint, especially in younger patients, are arthroscopy, high tibial osteotomy (HTO) and unicompartmental knee arthroplasty (UKA). The last two procedures require resection of bone stock (Iorio & Healy, 2003).

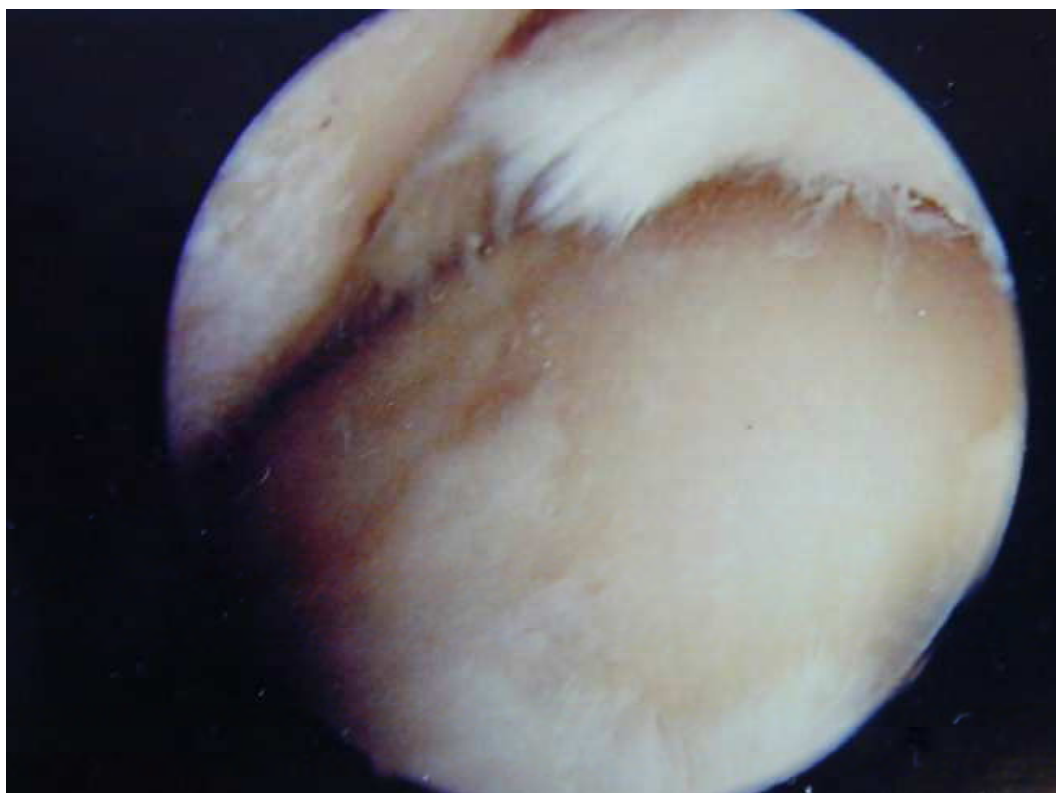


Fig. 1. Typical arthroscopic view of a patient with anteromedial osteoarthritis of the knee and degenerative lesion of the medial meniscus

A less invasive alternative to these procedures has been introduced in 2000 by Rick Hallock and Barry Fell: the UniSpacer™ implant (Zimmer, Inc., Warsaw, IN, USA), which is essentially a modern version of early metallic hemiarthroplasty as described by McKeever (McKeever, 1960) or MacIntosh (MacIntosh, 1958). However, due to a high failure rate between 16 and 44% as described by Bailie and Sisto, the implant is not available any more (Bailie et al., 2008; Sisto & Mitchel 2005).



Fig. 2. Early interpositional hemiarthroplasty (Springer et al., 2006)

Implantation of this self-centering, one-piece interpositional device into the knee joint does not require any resection of bone stock and is performed via minimally-invasive surgery (Scott, 2003). Initially, a cementless metal or polyethylene interpositional device has been implanted into the medial or lateral compartment.

The Unispacer is available in several thicknesses (between 2 and 5 mm) and sizes (38 - 58 mm) and adapts to knee kinematics (Marx et al., 2009). There are special models for the left and right side.

The UniSpacer™ is a device that is not fixed to any structures and therefore self-centering; it is used to relieve pain and to correct or minimize varus malalignment in unicompartmental osteoarthritis of the knee. The upper surface of the implant postoperatively adapts to the femoral condylus (Scott, 2003).

The UniSpacer™ is indicated in patients with isolated moderate degeneration of the medial compartment with minimal degeneration, and no significant loss of joint space in the patellofemoral compartment.



Fig. 3. UniSpacer™ metallic interpositional device



Fig. 4. and 5. Patient with medial osteoarthritis of the knee: a.p. stance and lateral view of the knee

Contraindications are inflammatory arthritis, severe instability due to advanced loss of osteochondral structure or the absence of collateral cruciate ligament integrity, as well as flexion/contracture greater than 15 degrees.

2. Operation technique (Hallock & Fell, 2003)

An arthroscopy is performed in order to prove the correct indication, intact ACL and PCL and medial meniscectomy of the posterior horn. After arthroscopy a 6-7cm medial parapatellar arthrotomy is performed. The rest of the medial meniscus is resected and osteophytes of the medial tibial plateau, the notch and around the patella are removed in order to avoid an impingement of the Unispacer. The size of the tibial plateau is measured with a special device and a probe is implanted. The correct size of the implant is controlled under fluoroscopy and the movement of the Unispacer in flexion and extension is documented. The whole medial tibial plateau should be covered in a.p. radiographs and a ventral impingement of the Unispacer with the femoral condyle should be ruled out. After implanting the original Unispacer, the wound closure is performed under usual conditions.

2.1 Rehabilitation

Weight bearing as tolerated can be performed with the use of crutches. A thrombosis prophylaxis is obligatory.

3. Results

The first results have been published by the designers group on 71 Unispacer knee system implants implanted in 67 patients. (Hallock & Fell, 2003).

The mean Knee Society knee score improved 169% in the 1-year group and 193% in the 2-year group. The mean Knee Society function score improved 31% and 65%, respectively. The mean Lysholm score improved 88% and 140%, respectively. Five implants (7%) were revised to total knee arthroplasty (TKA) and 10 implants (14%) were revised to another Unispacer Knee System implant.

Marx et al. implanted 14 Unispacer in 13 patients (4 women and 9 men). In 8 cases the left and in 6 cases the right knee joint was operated. There were no intra- or postoperative complications. There was no mobilization under anesthesia necessary. A dislocation of the spacer was not observed.

The notion of a self-centering mobile component correcting the varus knee internally without any need for bone resection has been, and still is, appealing. Clarius et al. evaluated clinical and radiological results and whether appropriate alignment change can be achieved by UniSpacer™ implantation (Clarius et al., 2003). In addition they examined the alignment change in the first 5 years after surgery.

In a retrospective study, 18 patients (19 legs) presenting with moderate stage isolated medial gonarthrosis, who had received UniSpacer™ hemiarthroplasty between 2002 and 2004, were assessed (implant thickness: 2, 3 or 4 mm); one patient received bilateral implantation; 12 right and 7 left knees had been treated. The average age of the patients (7 women and 11 men) at the time of surgery was 60.8 (48 to 72) years.

The clinical scores (Lysholm, AKS knee and function) preoperatively and at 1-, 2- and 5 year follow-up are shown in tab. 1.

Only 15 legs could be evaluated, as 4 patients had undergone revision UKA or TKA due to persistent pain. Average time to revision for the knees revised to TKA or UKA was 23.8 (± 18.0) months. So far, no dislocations have been observed in this study.

Clinical Scores	preoperative	1 year postop.	2 years postop.	5 years postop
Lysholm	59.1	85.4	90.2	97.2
AKS knee	60.1	87.4	88.7	96.6
AKS function	70.0	93.8	98.5	96.4

Table 1. Clinical scores preoperative, at 1 year-, 2 year- and 5 year follow-up



Fig. 6. and 7. Postoperative implant position



Fig. 8. and 9. Movement of the device during flexion due to the self-centering effect of the Unispacer

4. Conclusion

The use of HTO in the treatment of symptomatic varus malaligned knees has been propagated and thoroughly documented for several decades: it is a well-established therapeutic option (Nelissen et al., 2009). UKA has recently experienced a renewal of interest, with improved prostheses and techniques used. There have been reports of good long-term results for these methods. However, both can lead to distinct issues patients may be troubled with over the course of time. UKA comes with loss of bone matter in the medial compartment and, if conversion to TKA becomes necessary, bone grafts or metal wedge augmentation might be required in some cases (Springer et al., 2006).

Hemiarthroplasty with metallic interpositional devices, while first described over half a century ago, is also currently experiencing a renaissance as a treatment option of varus unicompartmental OA, the idea being to provide a means of treatment that minimizes the disadvantages of other procedures. It is used in cases where HTO is contraindicated or patients are too young for TKA. The ConforMIS iForma™ device, following the MacIntosh and McKeever rationale in being functionally fixed to the tibial surface, has had one favorable review; altogether, there are still few reports examining the use of the self-centering UniSpacer™ device in medial gonarthrosis.

Use of the UniSpacer™ in unicompartmental OA was initially recommended for young and active patients (Hallock & Fell, 2003). The role of this procedure still is not certain as it has been considered suitable for only few patients (1%) (Scott & Deshmukh, 2005) and there have been reports of poor postoperative results due to implant dislocation (up to 44%) (Bailie et al., 2005; Sisto & Mitchell, 2005).

Clarius et al. showed in their study a significant, slightly over-adjusting, correction of moderate varus alignment by UniSpacer™ arthroplasty, which does not correlate with the thickness of the implant used (Clarius et al., 2003). In the first postoperative year, a varus shift into a more neutral position could be observed, which is most likely due to adaptation of the implant to the joint. This effect is partly reversed in the following years by another slight valgus change, resulting, 5 years after surgery, in an average leg axis close to the one first achieved by UniSpacer™ implantation.

A high revision rate of 4 out of 19 UniSpacer™ implants in the first 5 postoperative years has been shown, which is unacceptably high compared to other treatment options. The reason for revision was persistent pain. There were no cases of dislocations. All revisions were technically easy to operate and uncomplicated. In all cases either UKA (2) or TKA (2) was performed and the patients were satisfied with the clinical results achieved after revision.

Looking at the high revision rates of the UniSpacer implant reported in the literature and in our study this metallic interposition arthroplasty does not seem to be a treatment option for patients with medial osteoarthritis of the knee. As there are reproducible good and excellent clinical and functional results reported with UKA after 10-15 years this operation should be preferred. However the clinical results of our remaining 14 patients with 15 operated knees were good and comparable to patients after UKA. Similar to the results of the metallic interpositional device of Mc Keever good results can be possible however the results are not predictable.

As a minimally invasive procedure, UniSpacer™ arthroplasty was seen as an alternative for treatment of varus malaligned knees in isolated medial gonarthrosis, due to good revision and conversion options.

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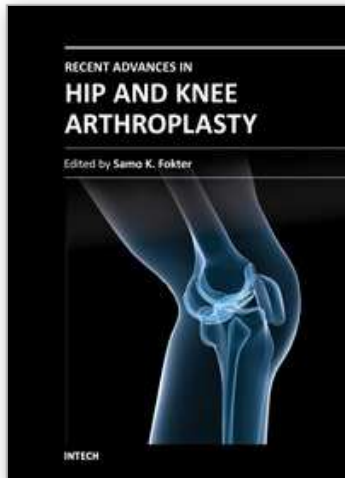
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The purpose of this book is to offer an exhaustive overview of the recent insights into the state-of-the-art in most performed arthroplasties of large joints of lower extremities. The treatment options in degenerative joint disease have evolved very quickly. Many surgical procedures are quite different today than they were only five years ago. In an effort to be comprehensive, this book addresses hip arthroplasty with special emphasis on evolving minimally invasive surgical techniques. Some challenging topics in hip arthroplasty are covered in an additional section. Particular attention is given to different designs of knee endoprotheses and soft tissue balance. Special situations in knee arthroplasty are covered in a special section. Recent advances in computer technology created the possibility for the routine use of navigation in knee arthroplasty and this remarkable success is covered in depth as well. Each chapter includes current philosophies, techniques, and an extensive review of the literature.

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