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Unicompartmental knee prosthetization: Which key-points to consider?

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Abstract

Unicompartmental knee arthroplasty (UKA) has evolved into a suitable option for diseased knees that cannot be managed with arthroscopic treatment and at the same time are not good candidates for total knee replacement. Since meticulous execution of the surgical technique is essential to optimizing UKA outcome, some procedural key-points are mandatory. Templates (phantoms) are then used to size the required prosthetic component (using these radiographs. Arthritic varus (or valgus) knees with an asymptomatic patello-femoral joint are typically ideal for UKA. Metal-backed tibial components should be favourite instead of all-polyethylene tibial components to avoid polyethylene creep that may occur in fixed bearings. Moreover, a proper thickness of the polyethylene layer is mandatory, in order to avoid early failure.

Key words: Knee; Unicompartmental knee prosthesis; Procedure; Surgery

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UNICOMPARTMENTAL KNEE ARTHROPLASTY

Unicompartmental knee arthroplasty (UKA) has evolved into a suitable option for diseased knees that cannot be managed with arthroscopic treatment and at the same time are not good candidates for total knee replacement (TKR). On initial consideration, UKA has several potential advantages over TKR, namely preservation of bone stock, cruciate ligament conservation, and sparing of the contralateral compartment and the patello-femoral joint[1]. Since meticulous execution of the surgical technique is essential to optimizing UKA outcome[2], some procedural key-points are mandatory. Preoperatively, appropriate implant selection requires the use of weight-bearing radiographs of the affected knee to better delineate true varus or valgus features of the arthritic compartment. Templates (phantoms)[3] are then used to size the required prosthetic component (Figure 1) using these radiographs. Arthritic varus (or valgus) knees with an asymptomatic patello-femoral joint are typically ideal for UKA[4]. If there is concern regarding the cartilaginous condition of patello-femoral joint, magnetic resonance imaging and subsequent arthroscopic evaluations[5] are suggested prior to selecting the definitive prosthetic solution as skyline knee radiographs may not be an accurate reflection of the joint condition. If patello-femoral joint disease is present, a TKR should be performed as there is a high likelihood that revision after UKA will be is a more suitable option as progression of

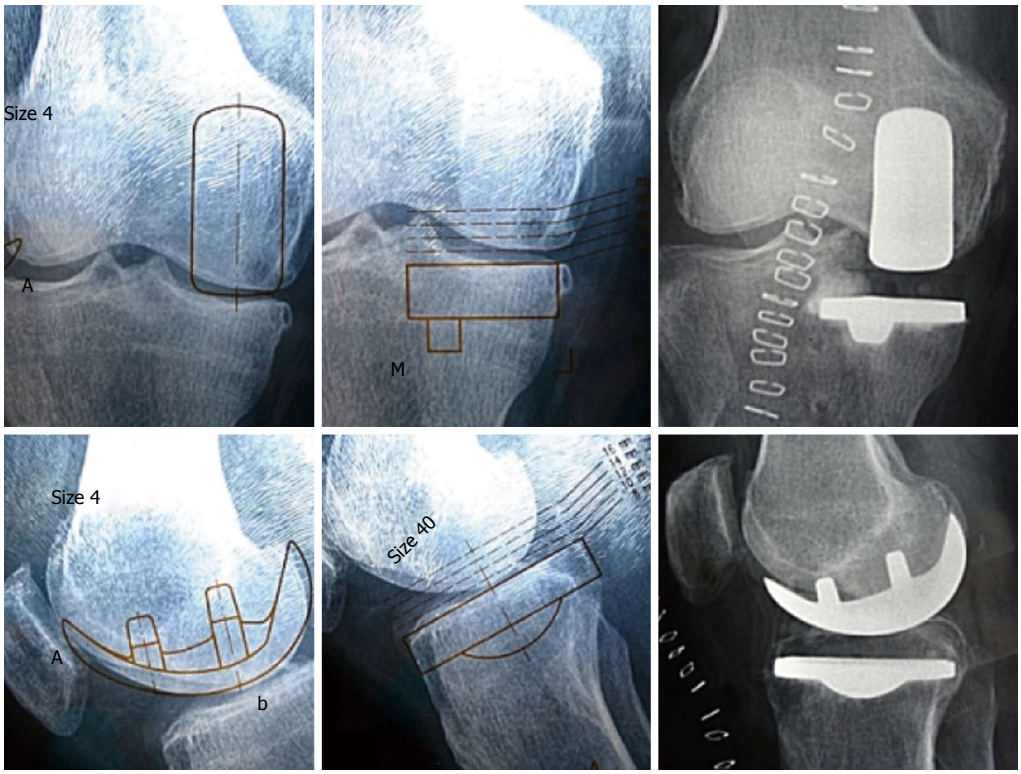

Figure 1 Example of a preoperative surgical plan of a medial unicompartmental knee arthroplasty right knee. Weight-bearing radiographs are templated against acetate phantoms. Immediate post-operation radiographs show correct positioning of the prosthetic implants.

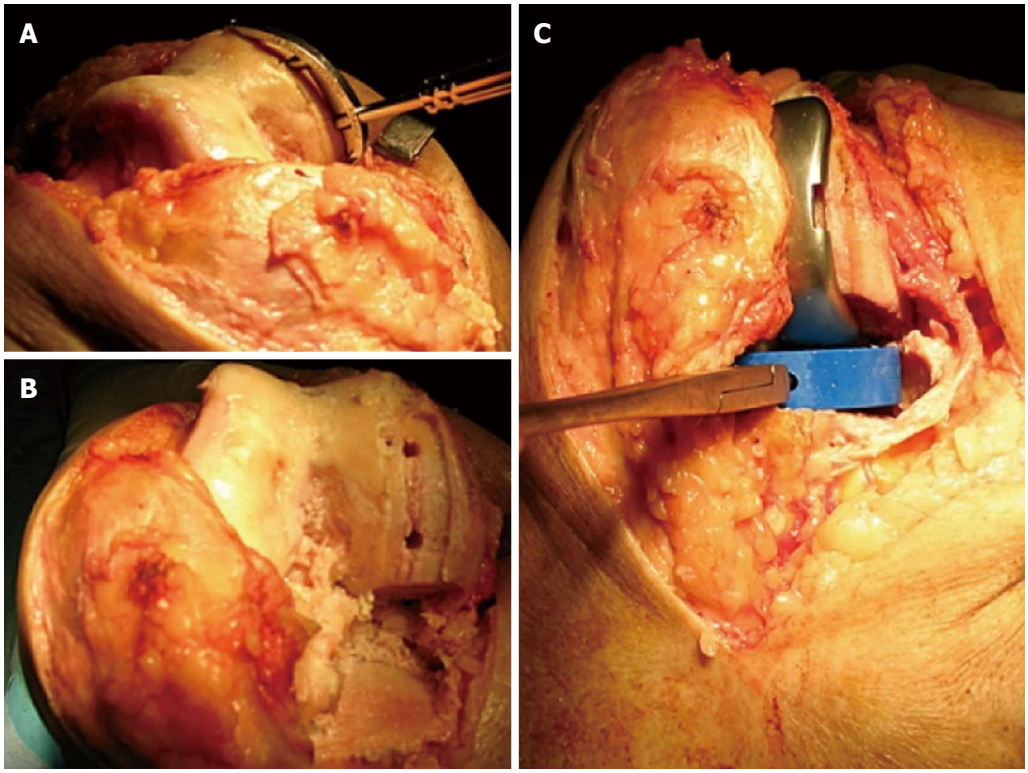

Figure 2 Knee bone cuts and positioning of trial components. A: A curved instrument available in different sizes allows to check the curvature of the condylus to prosthetize along with the amount of bone to remove; B: Femoral and tibial bony cuts. At this stage of the operation is essential to check eventual meniscal fragments, bony particulate and bony prominences that is made possible through a standard parapatellar approach; C: Femoral and tibial trials inserted with patella in place. Accurate trials size to choose definitive implants must be carefully checked.

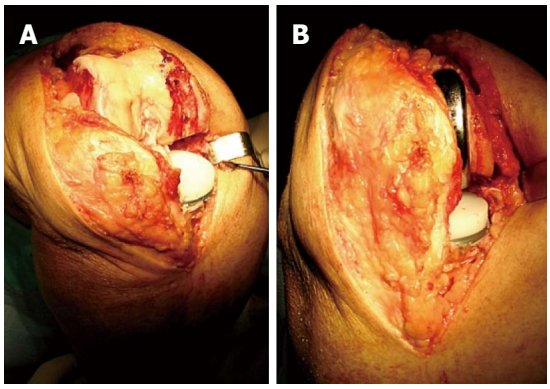

Figure 3 Cemented prosthetic components in place and patellar tracking assessment. A: Cemented tibial metal-back component in place with proper thickness of polyethylene insert; B: Cemented femoral and tibial components inserted along with patella in place. At this moment it is possible to verify ligament balance and patellar tracking.

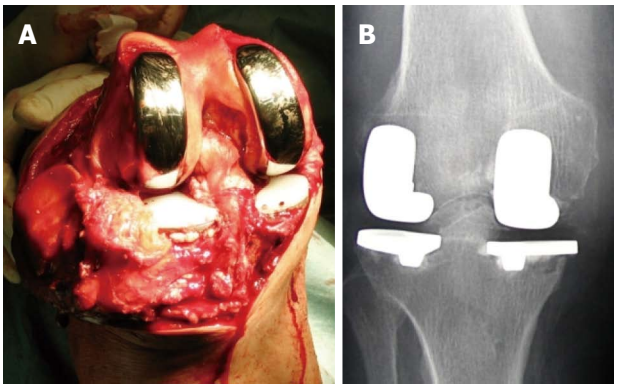

Figure 4 Bi-unicompartmental knee arthroplasty. A: In selected cases, bi-unicompartmental knee replacement is a feasible prosthetic solution that allows to maintain ligamentous compartments; B: This permits to have a more physiologic knee functionality, replacing only the affected parts of the articulation.

arthritis may involve not only the un-prosthetized contralateral compartment, but also the patello-femoral joint with progressive degeneration[6] and consequent surgical prosthesis revision. In general, metal-backed tibial components should be favourite instead of all-polyethylene tibial components to avoid polyethylene creep[7] that may occur in fixed bearings. Moreover, a proper thickness of the polyethylene layer is mandatory, in order to avoid early failure[8]. At the time of surgery, traditional Von Langenbeck's medial or lateral parapatellar surgical approach should be performed since the entire articulation (anterior and posterior compartments) should be evaluated to avoid leaving intra-articular bony particulate, residual sections of meniscus, posterior condylar bony cams, posteriorly extruded cement, and hidden osteophytes that may significantly contribute to implant failure[9] (Figure 2). Moreover, since all the three compartments are visualized, Von Langenbecks's approach allows thorough evaluation of ligament balance, avoiding over- and under-corrections, and permits a good assessment of patellar tracking (Figure 3). The same approach is mandatory in bi-unicompartmental knee replacement, an alternative prosthetic solution[10,11] that employs two unicompartmental prostheses and is utilizable in selected patients with asymptomatic patello-femoral articulation (Figure 4). In contrast, the use of minimally invasive approaches leads to reduced access to surgical landmarks[12] and is more likely to result in anatomic malalignment. Bent narrow Hohmann retractors are recommended instead of straight ones in order to minimize soft tissue stress during retraction and in a less invasive way protect the posterior neurovascular bundle during power-saw cutting of the condylus and the tibial plate. To conclude, it is also strongly suggested to use pulsed lavage irrigation to increase cement penetration and decrease both bone and poly-methyl-methacrylate debris particles[13,14] that may be responsible for third-body polyethylene abrasive wear.

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