Replacement arthroplasty of the valgus knee
A MODIFIED LATERAL CAPSULAR APPROACH WITH REPOSITIONING OF VASTUS LATERALIS

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Total knee arthroplasty (TKR) using a medial capsular approach gives worse results in arthritic knees with valgus deformity than in those in varus, usually because of swelling, poor wound healing and stiffness, instability, recurrent valgus deformity and poor patellar tracking.

A technique for replacement TKR of valgus knees using a lateral capsular approach was described several years ago, but was not routinely adopted because of the difficulties with and complexity of the procedure which included deliberate elevation of the tibial tubercle. In order to avoid this we have modified and simplified the procedure. Our preliminary results suggest that this lateral approach is safe and may give a better outcome than that through the medial capsule for the replacement of valgus knees.

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Keblish was the first to recommend a lateral capsular approach for total knee replacement (TKR) in the valgus knee and the technique was refined by Buechel. It has proved unpopular because it is considered to be technically more demanding and elevation of the tibial tubercle is recommended. We have modified the method to avoid this and have found that deliberate repositioning of vastus lateralis has abolished problems with patellar tracking.

Patients and Methods

In our unit the incidence of valgus arthritic knees is about 15% in patients who require TKR. We performed 27 consecutive TKRs in valgus knees using a lateral capsular approach with repositioning of vastus lateralis at closure.

There were 24 women and three men with a mean age of 68 years (57 to 91). Twenty-two had osteoarthritis and five inflammatory disease. The mean valgus deformity was 17° (10 to 35). Fixed flexion deformity was present in seven knees (mean 16°; range 5 to 45). On clinical examination much importance was placed on determining whether the deformity was fixed, correctable or unstable and this was further assessed by preoperative weight-bearing radiographs. In all 27 patients a standard cruciate-retaining cemented PFC knee replacement was used. The patella was resurfaced in 23 patients. The Knee Society scoring system was used for assessment.

Operative technique. It is important to keep the skin incision in the midline so that it does not interfere with medial eversion of the patella. The quadriceps tendon is clearly defined and incised longitudinally in the midline, starting 5 cm above the superior pole of the patella then curving along the lateral border of the patella down to the outer side of the tibial tubercle. At this point some fibres of the insertion of the patellar tendon may extend lateral to the crest of the tibia and these should be elevated medially as far as the crest. Any adhesions present in the suprapatellar pouch and the medial and lateral gutters are then divided. The incision in the quadriceps tendon is extended proximally beneath the fat and skin for 2 to 3 cm with scissors in order to release the contracted vastus lateralis completely from the patella and quadriceps tendon. This allows the subsequent reattachment of vastus lateralis in a better position, correcting the effects of the preoperative contracture, and helps to evert the patella medially. At this point the first stage of balancing of the ligaments should be carried out by elevating the iliotibial tract subperiosteally from the proximal tibia. This is an important step and avoids later division of the iliotibial band which is often required when these knees are replaced through a medial incision.

If there is a correctable valgus deformity, subperiosteal elevation of the iliotibial band and the lateral capsule should not continue laterally beyond the anterior half of the tibial circumference. Otherwise, further medial release may become necessary to compensate for increased laxity on the lateral side. The next two stages of balancing the soft tissues should be deferred until the trial components have been inserted. The patella is then displaced medially, with or without eversion, using a thin bone lever to keep it away...
from the medial femoral condyle. This gives adequate exposure for the femoral bone resection. If there is any suggestion of instability, distal femoral resection should be kept to a minimum, sufficient bone being removed from the medial femoral condyle to equal the thickness of the femoral component. It may be necessary to augment the lateral femoral condyle with bone graft. The anterior cut of the distal femur should be flush with the anterior femoral cortex to avoid compromising the patellofemoral joint which might restrict flexion of the knee and possibly lead to anterior knee pain. The anterior and posterior femoral cuts should be placed in slight external rotation. Once resection of the femoral bone is complete, eversion of the patella is facilitated which improves the exposure of the proximal tibia.

The risk of making a valgus cut of the proximal tibia is considerable, as is the risk of making a varus cut in the medial capsular approach. Great care should be taken with the tibial resection and it may be necessary to use intra-medullary alignment if the extramedullary system cannot be appropriately fitted since the patellar tendon may obstruct the correct placement of the tibial cutting guide. If this occurs there are three possible courses of action. The cutting block may be pinned in the correct position but in front of the patellar tendon. The saw blade will then have to be introduced carefully lateral to the tendon which may make completion of the tibial resection difficult. Secondly, the whole tibial cutting guide may be shifted laterally ensuring that it remains parallel to its original position. This will place the cutting block lateral to the patellar tendon. Otherwise, the intramedullary alignment system may be used. In our experience, with adequate mobilisation of the quadriceps tendon and patella proximally, it is almost always possible to deflect the patellar tendon sufficiently medially to allow the external tibial alignment system to be positioned in the normal way.

The trial femoral and tibial components with an appropriately sized tibial insert are applied and soft-tissue balancing may then be completed by proceeding to stage II as described by Buechel, which is a subperiosteal release of popliteus and the lateral collateral ligament from the lateral femoral condyle working proximally. It is important to keep checking the balance after sequential release of these tissues. A stage-III release, which consists of excision of the head of the fibula, has been described by Buechel, but we have not had to do this. With the foot in neutral rotation the knee should be flexed and extended and the rotational position of the tibial tray marked; the handle must be removed otherwise the patellar tendon will cause external rotation of the tibial tray. We believe that the rotational position of the tibial component should be judged with the knee in extension. If the patella is to be resurfaced this is also done with the knee in extension when the patella will evert easily. During cementing of the components the patella is everted or displaced medially, whichever gives adequate exposure.

No attempt should be made to close the lateral retinaculum completely. This will only serve to increase the compressive and lateral forces on the patella. The lateral retinaculum should be closed with the knee in 70° or 80° flexion and the lateral cuff of the quadriceps tendon with attached vastus lateralis is then sutured to the quadriceps tendon under gentle tension, effectively repositioning vastus lateralis proximally. This leaves a defect at the distal end of the capsular incision which is left open. We do not attempt to fill this defect with fat pad as described by Keblish and Buechel.

Results

The mean stay in hospital was seven to nine days. One patient was not discharged until the 18th postoperative day because of cellulitis of the operated lower leg, which was the site of an ulcer before operation. It was promptly controlled with aminoglycosides and penicillin. Another, a 91-year-old woman with very poor skin, was very slow to mobilise and her wound took longer to settle; she was discharged after 22 days.

In 25 knees the tibiofemoral alignment was 5° to 7°. In two knees the tibial cut was valgus (5° and 7°). In neither of these has the short-term result been compromised. External rotation deformity was corrected in every knee. There were no complications and all the wounds healed satisfactorily, including the one patient with delayed healing. Skyline radiographs have shown acceptable placement of the patella and the patellar component in every case. The mean knee score was improved from 34 before operation to 95 at the 12-month follow-up and the mean function score improved from 35 to 61.

In 25 knees the mean flexion was 117° (110 to 135). Two had some residual fixed flexion (10°). In one patient with Alzheimer’s disease and a preoperative deformity of fixed valgus of 25° and fixed flexion of 15°, the deformity was fully corrected at operation, but he subsequently developed 10° of fixed flexion deformity and his range of movement at the 12-month follow-up was 10 to 110°. In another there was a fixed valgus deformity of 15° with a range of movement of 45 to 65° preoperatively. The eventual range of movement was 10 to 95° and the patient was very pleased with the outcome. These patients had a greater range of flexion on average (117°) than we have obtained with our first 100 consecutive PFC knee replacements at seven to ten years (105°) and with our current results for all knee replacements (110°).

All 27 patients claimed to be completely free from pain at the 12-month review. Even on direct questioning they denied any anterior knee pain or discomfort.

Discussion

Stern, Moeckel and Insall and Karachalios, Sarangi and Newman have reported disappointing results with the
medial capsular approach for valgus knees. Most surgeons continue to use a medial approach for these knees and there is no doubt that they may be successfully replaced using a medial parapatellar exposure. It is, however, almost always necessary to do a lateral release to obtain adequate correction of patellar tracking. Release of the lateral structures to balance the soft tissues may involve further considerable soft-tissue dissection including division of the iliotibial band and release of the lateral collateral ligament and popliteus. Such extensive soft-tissue dissection may devitalise the patella and cause considerable haemorrhage and oedema. This may be one of the reasons why the results of replacement of valgus knees seem to be more disappointing when a medial capsular approach is used. The extensive soft-tissue surgery also tends to exacerbate any underlying instability which may explain why a considerable number of such arthroplasties require some form of prosthetic constraint.

In a valgus arthritic knee, the lateral and patellofemoral compartments are usually diseased and it would therefore seem logical that this would be dealt with most effectively by a direct approach to these areas. Although Keblish and Buechel recommended the lateral capsular approach for replacement of the fixed valgus knee, we suggest that this should be used for all types of valgus deformity, not only because it would appear to be the best way of correcting the deformity, balancing the soft tissues and restoring patellar tracking, but also because its regular use for all valgus knees will facilitate its ease of application.

The technical difficulties of the lateral capsular approach are eversion of the patella and exposure and accurate resection of the proximal tibia. The patellar tendon must not be avulsed since this is a potential disaster; it was for this reason that deliberate elevation of the tibial tubercle with a piece of attached bone was recommended by Keblish and Buechel. This aspect of the technique appears to be one of the reasons for its unpopularity. Our results so far suggest that the technical difficulties can be overcome without risk of avulsion of the tibial tubercle.

The problem of the subluxed and arthritic patella so often found in valgus knees is dealt with by the lateral capsular approach itself which in effect is a radical lateral release. In our experience, when combined with repositioning of vastus lateralis during capsular closure, it consistently restores normal patellofemoral tracking. In addition, studies on the pressures in the patellofemoral joint indicate that these are much reduced compared with closure of vastus lateralis in its contracted position. The defect in the lateral capsule which is created does not cause any problem with wound healing or function and we do not fill it with fat or soft tissue.

We have been able to deal with quite severe deformity, both fixed or correctable, without resort to any form of prosthetic constraint. This suggests that in valgus knees the lateral capsular approach allows much better balancing of the soft tissues than the medial capsular approach. Furthermore, soft-tissue balancing may be achieved without excessive dissection and gives better protection to the blood supply to the patella. The risk of postoperative haematoma and stiffness, and the need for more constrained implants, are much reduced.

We suggest that the lateral capsular approach for the replacement of valgus knees may be the technique of choice but that it requires further evaluation. We are currently performing a prospective, randomised trial to compare the medial and lateral approaches in the replacement of valgus arthritic knees.

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References