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Spinout/Dislocation in Mobile-Bearing Total Knee Arthroplasty: A Report of 26 Cases

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ABSTRACT

Background: Excellent medium-term to long-term results for function and survivorship have been shown with mobile-bearing (MB) total knee arthroplasty (TKA). One of the key arguments against its use is the risk of "spinout" or dislocation of the MB.
The aim of this study is to discuss the etiology, prevention, incidence, management, and outcome of spinout.
Methods: Between October 1993 and February 2016, 8373 consecutive primary MB TKAs were performed irrespective of preoperative deformity.
Before 2001, soft-tissue knee balancing was achieved by release of collateral ligaments and all spinouts were treated by open reduction. Thereafter, soft-tissue balancing was achieved without ligament release and with the use of a higher conformity MB and all spinouts were reduced closed, giving 2 comparative cohorts.
Results: Twenty-six spinouts occurred in 8373 (0.31%) patients. In the first cohort up until May 2001, there were 14 spinouts of 2379 (0.58%) cases. There were 12 in cohort 2, in those patients having surgery after May 2001, thus giving an incidence of 12 of 5994 (0.2%), which was significantly lower than in cohort 1 ($P < .01$). Spinout was associated with the valgus knee ($P < .01$) and most (73%) occurred within the first 6 months. There was 1 arthrodesis in cohort 1 and 1 both-component revision in cohort 2.
Conclusion: The etiology of spinout is flexion gap instability. It can normally be reduced closed with recurrence being uncommon. Focus on soft-tissue balance necessary with an MB TKA can reduce the incidence of revision for instability as compared to a fixed-bearing TKA. Therefore, the risk of spinout should not be used as an argument against the MB TKA.

Excellent medium-term to long-term results in terms of function and survival have been reported with mobile-bearing (MB) total knee arthroplasty (TKA) [1–3]. Proponents of MB TKA state 2 main theoretical advantages over fixed-bearing (FB) TKA. Firstly, reduced wear and loosening, due to increased articular surface congruity which reduces contact stress on the polyethylene and lower stress transfer to the component-bone interface [4]. Secondly, there is theoretically better function due to extra rotational movement allowing some degree of self-alignment. However, these theoretical advantages over the FB TKA have not been confirmed by better survivorship [5–10] or function [11,12]. Another theoretical advantage may be protection of the tibial implant-bone interface when using a cementless tibial component. For many surgeons, these theoretical advantages are outweighed by the risk of bearing spinout. However, in FB TKA, instability and dislocation remain a significant problem and are reported as the primary reason for revision in 17.8% and 4.5%, respectively, in all single-stage revisions in the latest National Joint Registry report [13].

Spinout, which is otherwise known as dislocation of an MB in TKA, is an uncommon but significant complication [14–18]. It can

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Ethical review committee statement: All information in this article is from routine follow-up by the Outcomes Staff in the Primary Joint Unit. This study is an observation of routine practice and no extra interventions or studies were introduced for patients as a consequence of this study and therefore it was exempt from local ethical committee approval.

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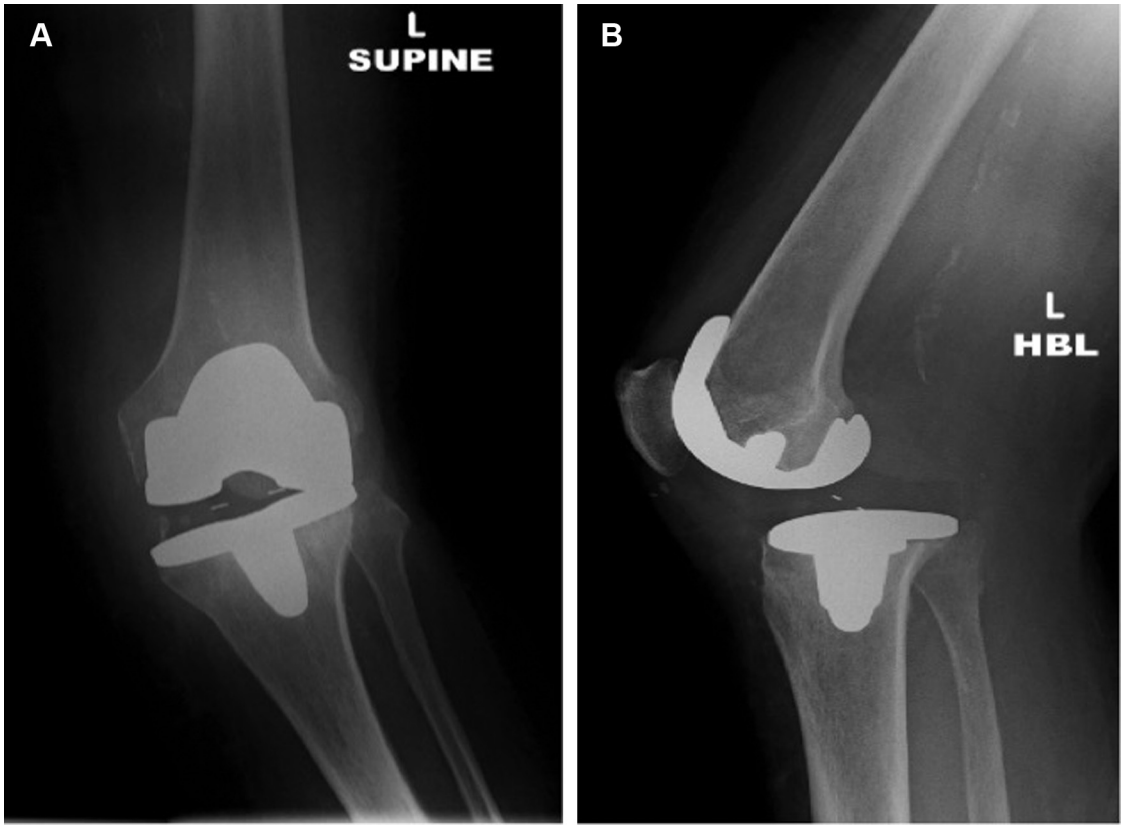

Fig. 1. (A) AP X-ray of a spinout. (B) Lateral X-ray of a spinout.

have a major effect on a patient's outcome and has historically almost always required open surgery [19]. The aim of this study is to discuss the etiology, prevention, incidence, management, and outcome of spinout. The study compares the incidence of spinout in 2 cohorts of patients all with MB TKA defined primarily by the method of soft-tissue balancing. We hypothesized that the rate of spinout is much lower in the second cohort of patients who had their knee replaced after May 2001 by a method of gap balancing and more conservative soft-tissue releases. It also describes a method for closed reduction of the most common type, which is posterolateral.

Methods

Between October 1993 and February 2016, 8373 consecutive primary TKAs have been carried out under the care of a single surgeon in our Primary Joint Unit, using an unconstrained, cruciate-sacrificing, nonposterior-stabilized MB prosthesis (LCS MB TKA [DePuy Orthopaedics Inc, Warsaw, IN]). This number excludes 623 knees, which had a cementless Oxford MB unicompartmental knee replacement (Zimmer Biomet, Warsaw, IN). In no cases of TKA was a constrained or FB used, irrespective of deformity.

The Primary Joint Unit has a system of being referred back patients from other units nationally so that all complications are recorded, dealt with in-house, and subsequent outcome followed up. All complications following surgery are recorded on an electronic information system by a team of arthroplasty care practitioners who are responsible for collection of preoperative and postoperative data to assess the outcome of surgery.

Twenty-six patients in total had one or more spinouts. This is where the MB was dislocated from its functional position (Figs. 1A and 1B). Clinical notes and X-rays were reviewed to identify age, sex, date of surgery, time to spinout, preoperative angle of deformity, method of soft-tissue balancing, method of treatment of spinout (open vs closed), and clinical follow-up.

During the first cohort, soft-tissue balancing was carried out by releasing soft tissues including release of collateral ligaments. In a severe valgus knee, this involved detaching the lateral collateral ligament, the popliteus, and the lateral head of gastrocnemius from their insertions into the femur. From 2001, irrespective of deformity, collateral ligaments have not been released and initial management of all spinouts has been closed reduction as opposed to open, which had been used for all in the first cohort.

The surgical technique for soft-tissue balancing for cohort 2 is one of gap-balancing that has been previously described [20–23]. It is performed through a medial parapatellar approach with exposure of the proximal tibia as far posterior as the midcoronal plane medially. The mechanical axis of tibia is identified with an extramedullary jig held with pins proximally and centered midway between the malleoli distally. The tibial cut is perpendicular to this and matching the posterior slope of the medial tibial condyle. The anteroposterior (AP) femoral cuts are then made using the femoral guide positioner, which sets femoral rotation off the tibial axis. After measuring the flexion gap, a conservative distal femoral "precut" is made using an intramedullary jig which is set to give an initial distal femoral cut of 5° with respect to the anatomic axis. Subsequently, the conservative extension gap is assessed with a spacer block. If the gap is balanced (cuboidal), then the remaining bone is removed from the distal femur by a finishing distal femoral cut at the same 5° angle to make the extension gap the same size as the flexion gap. If the gap is unbalanced (trapezoidal gap) and tighter medially, the finishing cut on the distal femur is made at an angle of 3° or 4° as required to achieve a cuboidal extension gap. If the gap is trapezoidal and tighter laterally, the finishing cut is made