

# Ideal alignment for UKA: are we any closer?

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The recently published article by Petterson *et al*<sup>1</sup> questions the role of alignment in outcomes after medial unicompartamental knee arthroplasty (UKA). In this review the authors select a series of articles to review, in order to provide improved clarity around guidelines for the ideal alignment to aim for when performing UKA. The authors also have the additional related aim of providing clearer guidelines for the degree of preoperative deformity that can be accepted when performing UKA. There is a disparity of opinion within the orthopaedic community as to the indications for UKA, with some authors advocating that up to 50% of arthroplasty patients are suitable,<sup>2</sup> while others advocate almost exclusive use of total knee replacement (TKR). Given this disparity, a review can be helpful in clarifying indications and utilisation of this procedure.

The authors quote the rates of UKA being 8%–15% of all arthroplasty. This figure is quoted from a UK paper from 2009,<sup>2</sup> and this figure has fluctuated since that time, varying widely around the world and also between centres within the same country. UKA ‘enthusiasts’ will see broader indications, and for example in some regions in Europe higher rates of utilisation are seen. In Australia, the 2019 National Joint Registry Report<sup>3</sup> reported a partial knee replacement rate of 7.8%, about half of the rate reported when the registry first reported this in 2003. The 2019 Swedish Registry<sup>4</sup> reported a similar rate of 8.9%. Over this same time period the revision rate for unicompartamental knee replacement in the Australian Registry was three times that for TKR. There is no doubt that the presence of independent registry surveillance within a country has an impact on surgeons’ choices, as risk of revision is a major criterion impacting decisions. The oft-present disparity between results reported by individual authors and that reported in registries suggests that the excellent outcomes and high survival

rates reported by specialist centres may not be reproducible across the wider orthopaedic community. For this reason it is likely that many surgeons view TKR as the ‘lower risk’ option.

In reviewing the literature the authors find some general concepts that are universally accepted. Overcorrection into valgus is clearly to be avoided, as it results in higher failure rates. This is somewhat intuitive, as it will realign patients to an alignment they have never experienced: an ‘unnatural’ alignment that can result in poorer functional outcomes, and excessive lateral compartment loads leading to premature wear and failure. What also seems clear is that for patients who have a deformity that is correctable to neutral or slight varus, restoring patients to their original ‘constitutional’ alignment is appropriate, and should lead to good functional outcomes without compromising longer term survival. As the authors mention, excessive residual varus will result in excessive loads on the replaced compartment with increased risk of revision.

The main remaining question therefore lies around what constitutes ‘excessive varus’, and how to manage patients whose deformity is not fully correctable, including those patients with tibia vara in which an intra-articular correction of an extra-articular deformity is required. Traditional indications would suggest that patients should have a fully correctable deformity to within a normal ‘constitutional varus’ of 1°–3°. The authors seem to generally conclude that a residual varus >7° should be avoided, leaving a relatively ‘grey’ area between 3° and 7°. The authors also quote their own experience of 148 knees with average preoperative deformity of 7°, and an average correction of 2°. The average final alignment is not reported, but working from the above average correction one would assume the average residual varus post-operatively was 5°. The authors’ experiences have not (yet) been published, but they do quote two other papers describing correction of more severe deformities, with good short-term results. It would seem reasonable to say that at this stage these results are preliminary and caution should be advised, both with significant residual varus and



with larger uncorrectable deformities. It would also seem reasonable to assume that once an arthritic joint has developed a significant fixed deformity, the joint is more globally affected, rather than an isolated unicompartamental disease, and therefore a unicompartamental procedure may be compromised.

The authors also review the techniques that have been developed to achieve a more accurate and reproducible intraoperative alignment, specifically patient-specific instrumentation (PSI) and robotics. Given the importance of alignment to outcome surgeons will employ techniques that allow them to reliably achieve their desired alignment. The authors conclude that PSI provides mixed results, with no consistent benefit over conventional techniques. Early investigations into robotics have however shown excellent alignment and outcomes,<sup>5</sup> while other studies indeed suggest no improvement in outcomes over conventional techniques.<sup>6</sup> When considering registries, robotic assistance for UKA is already beginning to show improved survival<sup>3</sup> at this relatively early stage. Given that robotics assists with surgical planning, implant positioning and sizing, and accuracy in surgical cuts and balancing, it is intuitive that this should lead to improved outcomes. As the authors suggest, further analysis is needed to determine whether the increased complexity and costs associated with robotics are offset by improved outcomes, but it does seem fairly clear that this type of technological advance will become an increasingly common component of our surgical armamentarium.

Success in UKA is determined by a number of variables, including patient selection, surgical precision and implant

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selection. This review has focused on the importance of preoperative planning in selecting patients within appropriate indications for UKA, and working towards postoperative alignments that are compatible with good functional outcomes without compromising long-term results. It provides some clear guidelines, and identifies others that remain less clear. Surgeons are often faced with choices between partial and full knee replacement, and also osteotomy. It is important for surgeons to make evidence-based decisions, based not just on the opinion of key opinion leaders, or small group studies that may be unrepresentative of the majority of orthopaedic practice, but more on wider reviews that carefully assimilate all of the higher quality studies and registry data that are now available.

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