



# Patella resurfacing in total knee arthroplasty: A review of current literature

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## Abstract

### Introduction

The issue of patella resurfacing following Total Knee Arthroplasty (TKA) has always been controversial among Orthopaedic surgeons. There are a lot of arguments, for or against patella resurfacing; and a lot of evidence has been published to support or discourage the procedure. Therefore, this review, aims to analyse the evidence in the literature, for or against patella resurfacing, with a view to finding out which has more support and better outcomes for patients.

### Methods

This is a narrative review of the literature to find the relevant articles related to patella resurfacing after TKA. A search was carried out on Pubmed using the appropriate words to come up with any published evidence regarding this procedure. These articles were read by the authors and relevant arguments for or against the procedure were documented and critically analysed.

### Results

Many articles gave advantages and disadvantages for patella resurfacing following TKA. However, most of them are in favour of selective resurfacing or non-resurfacing of the patella, on a case by case basis. There is also need to discuss the issue fully with patients, and make them understand why such a decision is taken, in order to avoid misplaced expectations or disappointment if complications arise.

### Discussion and Conclusion

TKA is a reliable procedure used to correct knee deformities, relieve pain and improve knee function usually following arthritis. Anterior knee pain is a major post-operative complication that compromises patient's satisfaction. This led to several techniques of treatment to be proposed, which include patella denervation and resurfacing. However, patella resurfacing has become a controversial issue, which necessitates proper review of the literature, with a view to establishing the strongest evidence available in support of the procedure. However, from the review of current literature, there is no sufficient evidence to support the idea of routine resurfacing or non-resurfacing of the patella. Therefore, it may be more sensible to selectively resurface the patella based on an

objective assessment of pre-operative symptoms, radiographic images and intra-articular findings of the arthritis affecting the patello-femoral joint. There is also need to involve the patient in the decision so that we can have an informed consent before carrying out the procedure.

### Introduction

Total Knee Arthroplasty (TKA) is a reliable orthopaedic procedure used to correct knee deformities, relieve pain and improve knee function usually following arthritis<sup>1</sup>. Anterior knee pain is a major post-operative complication that compromises patient's satisfaction. This led to several techniques of treatment to be proposed in the literature. Some surgeons adhere to patella denervation with or without resurfacing as the patella is innervated by the medial and lateral patella nerve. The role of Substance-P nociceptive afferent fibres in the patella soft tissue has also been revealed as a cause of anterior knee pain, in the literature<sup>2</sup>. Other surgeons resort to routine patella resurfacing during primary TKA. However, numerous randomised controlled trials on the benefit of this procedure yield conflicting results. Some produce no benefit to the patients<sup>3,4,5</sup>. This led to a difference of opinion amongst many orthopaedic surgeons worldwide, and the decision to resurface the patella is often made intra-operatively, based on the severity of the patello-femoral osteo-arthritis, among other factors.

In England and Wales the national Joint Registry reported a total of 79,516 primary knee arthroplasties in 2011. During primary knee replacement, about a third of the primary TKAs had their patellae replaced. 37% of the cemented primary TKAs and 8% of the uncemented primary TKAs had their patellae replaced.<sup>3,6</sup> A much higher figure of 50% has however been reported in Australia, whilst in Sweden only 3% resurfacing rate was reported. Advocates believe resurfacing reduces complication rates and guarantees a predictable outcome with less anterior knee pain<sup>7</sup>. Whilst others believe that it contributes to post-resurfacing complications like patella fracture, patella tendon injury, joint instability, failure of the patella components, patella clunk syndrome<sup>8</sup>, and increase operative cost and time with no overall benefit to patients<sup>9,10</sup>.

The ultimate aim of any surgical procedure is improvement of patient's quality of life. Therefore, the department of health in conjunction with the National Joint Registry (NJR) for England and Wales announced a nationwide programme called Patient Reported Outcome Measures (PROM), wherein all NHS patients are requested to voluntarily complete a questionnaire preoperatively and 6

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months post-op for 4 types of elective operations: Total Knee Arthroplasty (TKA), Total Hip Arthroplasty (THA), Groin surgery and Varicose vein surgery. Studies using PROM data in conjunction with Oxford Knee Scores showed no additional benefit with patella resurfacing<sup>11</sup>. This controversy exists since the first TKA in the 1970's. Popular indications for patellar resurfacing are: patella cysts, rheumatoid arthritis, loss of congruency between patella and trochlear, design of the prosthesis, poor tracking of the extensor mechanism and overweight.

Poor surgical techniques and prosthesis design is thought to influence post resurfacing complications<sup>12</sup>. Improvement in prosthesis design and techniques is shown to greatly lower complications<sup>13,14</sup>. Given the enormous controversy, decision about patella resurfacing should be made based on assessment of individual patient clinical presentation and intra-operative state of the patellar. The 'Outerbridge Classification' of patellar articular cartilage has been used in the literature (Table 1)<sup>8</sup>. A prospective randomised controlled study by Rodriguez-Merchan et al 2010, showed a 21 times likelihood for patella resurfacing in patients with Outerbridge grade IV patella-femoral finding<sup>8</sup>. Hence, they recommended resurfacing in this group of patients<sup>8</sup>. In another randomised controlled trial conducted by Beaupre et al (2012), at a tertiary Canadian health centre in a -10 years follow-up period, they found out that approximately 10% of patients without initial patella resurfacing required resurfacing early in the post-operative period due to anterior knee pain.

### Discussion

In a retrospective study comparing the clinical outcomes between patella resurfacing and non-resurfacing in total knee arthroplasty (TKA), Li et al (2012)<sup>15</sup>, studied the demographics and clinical outcomes of one hundred and thirty patients using anterior knee pain, Knee Society Score (KSS), patient satisfaction, revision rates and x-ray findings. They found no statistically significant differences between the two groups with regards to any of the clinical outcome measures studied. In the non-resurfaced group, 14.1% of the patients had anterior knee pain post-operatively; with a revision rate of 9.89%, while 5.1% of the resurfaced patients had anterior knee pain; with a revision rate of 3.4%<sup>15</sup>. A recent literature review also showed similarity of outcomes between resurfacing and non-resurfacing, and so the authors suggested that selective resurfacing will offer a better compromise by using a reliable method of assessing the benefits of resurfacing before carrying it out, rather than randomly allocating patients to one group or the other<sup>16</sup>.

Khan et al (2012)<sup>17</sup> carried out a review on the difference of post-operative patello-femoral (PF) pain, patella clunk, and crepitus in patients with or without resurfacing after five years of follow-up. Their results revealed a higher incidence of patellar clunk in patients with pre-operative patello-femoral pain, who underwent patella resurfacing.

**Table 1: Outerbridge Classification<sup>8</sup>.**

Grade	Pathology
I	Softening and swelling of articular cartilage
II	Fissuring and fragmentation of articular cartilage involving an area less than 0.5 inches
III	Fissuring and fragmentation of articular cartilage involving an area greater than 0.5 inches
IV	Cartilage erosion to bone

In those without PF pain and underwent resurfacing, there was a greater occurrence of crepitus among them. However, in patients without pre-operative PF pain, there was a higher incidence of post-operative pain, clunk and crepitus among patients who had patelloplasty, compared to other patients in the non-resurfacing group<sup>17</sup>. Another review<sup>18</sup>, involving one hundred and fifty patients who had total knee arthroplasty with or without patella resurfacing, revealed no clear advantage in resurfacing over non-resurfacing in patients who had TKR, three years post-operatively<sup>18</sup>.

Furthermore, a recent review of 49 Total Knee Replacements in which patient had patelloplasty and patella decompression of the arthritic surfaces, rather than resurfacing; revealed that decompression and patelloplasty can be considered for the treatment of anterior knee pain in selected patients, with reasonable results. However, it was not clear whether the benefits of these procedures were superior or equal to resurfacing or not<sup>19</sup>. Further randomised comparative studies may have to be carried out with regards to this.

Smith and colleagues (2008)<sup>20</sup>, also carried out a prospective randomised trial of 142 patients who had total knee replacement with and without patella resurfacing using the Profix total knee system (159 procedures). The patients were followed up for three to seven years, with a mean follow-up period of four years. They were assessed using the knee pain scale and the knee society clinical rating system. There was no demonstrable benefit of patella resurfacing compared to patients who were unresurfaced. Both groups had comparable number of patients with post-operative anterior knee pain (30.1% in resurfacing and 20.9% in the non-resurfacing groups). There was no revision carried out in relation to the PF joint in both groups, but there was a strong link between knee flexion contracture and anterior knee pain in patients who had patellar resurfacing procedures<sup>20</sup>.

In a retrospective review of functional and clinimetric aspects, van Hemert et al (2007)<sup>21</sup> studied 53 patients who were divided into two groups of patella resurfacing and non-resurfacing. These patients had similar demographics, and were assessed using functional knee scores. They found that patients who underwent resurfacing in TKR had a functional advantage over those who were not resurfaced. However, there was no difference in the Knee Society Scores (KSS) and the Minimod Gait Test between the two groups<sup>21</sup>.

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Many other previous randomised trials regarding patellar resurfacing have come up with conflicting or unconvincing results. This is mostly as a result of the complications associated with patellar resurfacing<sup>22</sup>. Some of the commonly observed complications include patellar instability, patella fracture; implant loosening, migration, polyethylene wear, patella tendon rupture, patella clunk syndrome and persistent anterior knee pain, in spite of the resurfacing<sup>22</sup>. A few case reports of extra-articular migration of the patella button, following Total Knee Replacement have also been reported<sup>23</sup>. The risk of complications following patella resurfacing is between 1.5-12% of all Total Knee Replacements, with a range of 4-50% in all revision TKRs. As a result of these, there have been significant improvements in implant design, and surgical techniques; in order to prevent or minimise these complications<sup>22</sup>.

In a ten year randomised prospective trial of patellar resurfacing in total knee replacement, one hundred consecutive patients with knee OA, were randomised to undergo TKR with or without patella resurfacing<sup>24</sup>. There outcome measures used were the American Knee Society Score, Western Ontario and McMaster University Osteoarthritis index and radiographic assessment up to for years following the procedures. Both group of patients had similar demographics, and they were followed up for up to ten years; apart from those who were excluded due to death (22), dementia (7), declined to participate (3), and those who were lost to follow-up (10). There was no significant difference between the two groups: both had comparable reduction in the functional scores over time, and no further PF complications were noticed in either of the two groups<sup>24</sup>.

Feller and colleagues (1996)<sup>25</sup> studied forty patients who underwent total knee arthroplasty (TKA) and were randomly allocated to either have patella resurfacing or non-resurfacing. Thirty eight of these patients, who survived were followed up for three years using the HSS knee score and another Patellar score with a maximum of thirty points. They revealed that the mean HSS and Patellar scores at the final follow-up were 89 and 28 in the un-resurfaced group; whereas, it was 83 and 26 in the patellar resurfacing group. There were however, statistically significant lower scores for both measures in women and bigger patients. The resurfaced group were also found to have better stair-climbing abilities<sup>25</sup>.

In a review on the management of the patella in total knee arthroplasty, Hsu noted that there are surgeons who resurface the patella routinely, some who selectively resurface, and some who don't routinely resurface the patella at all. He however, emphasised that selective patella resurfacing or non-resurfacing is probably the best option, as long as the indications are carefully selected<sup>26</sup>. He suggested that patella resurfacing should be carried out in patients with inflammatory arthritis, completely destroyed patello-femoral joint, or patella maltracking. Whereas, he suggested that the patella should be preserved when it is small, has normal articular surface, or when there is

normal patella tracking. These factors should be supplemented by proper component design, size, placement and technique; in order to give the best results following resurfacing of the patella<sup>26</sup>.

### Conclusion

Patella resurfacing is still a controversial topic among Orthopaedic surgeons, and there are a lot of arguments for and against it in the literature. However, from the review of current literature so far, there is no sufficient evidence to support the idea of routine resurfacing or non-resurfacing of the patella<sup>27</sup>. Therefore, it may be more sensible to selectively resurface the patella based on an objective assessment of pre-operative symptoms, radiographic images and intra-articular findings of the arthritis affecting the patello-femoral joint. Because of the numerous complications which can result from resurfacing, it is better to be objective in treating the patient according to the principle of 'do no more harm' which all clinicians ascribe to in the Hippocratic oath. This decision should therefore not be left to the whims and caprices of the surgeon, without regard to its benefits to the patient or the complications that may arise from a needless procedure, which can harm the patient or add to their distress.

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