

HOW AND WHY WE RESURFACE THE PATELLA

<https://doi.org/10.71165/b097-1azc>

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SUMMARY

Background: Although the clinical necessity of patellar resurfacing in total knee arthroplasty remains a subject of orthopedic debate, international registry data indicate lower revision rates when the patella is resurfaced during the primary procedure. As prosthetic designs and surgical technologies evolve, the epidemiology of failure mechanisms shifts, necessitating precise techniques to optimize patellofemoral kinematics and ensure long-term implant stability.

Objective: This article describes a standardized surgical technique utilizing inlay milling to consistently restore native patellar thickness and ensure stable tracking within the prosthetic trochlear groove.

Key Points: The primary surgical objectives include achieving a composite thickness equivalent to the pre-osteoarthritic state and ensuring adequate polyethylene coverage. Compared to traditional oscillating saw techniques, which may result in asymmetric resection, malalignment, or excessive bone loss, milling offers enhanced reproducibility and safety. This is particularly relevant for surgeons in training or in cases involving significant bone deficiency. The described technique involves initial thickness measurement followed by a lateral facetectomy to optimize capture ring stability. An inlay milling system is utilized to establish a precise resection plane, after which the peripheral bone rim is removed using rongeurs and an oscillating saw. To mitigate the risk of iatrogenic patellar fracture, a minimum residual bone thickness of 15 mm is maintained. Final assessment confirms medial patellar articulation with the trochlea at 30° of flexion, typically obviating the need for lateral retinacular release.

Conclusion: Inlay milling provides a safe and reproducible method for patellar preparation in total knee arthroplasty. This approach facilitates precise implant positioning and restores near-anatomic patellofemoral tracking, potentially contributing to improved clinical outcomes and reduced revision risk.

KEYWORDS

Arthroplasty, Replacement, Knee; Patella; Osteoarthritis, Knee; Patellofemoral Joint; Reoperation

OUR INDICATIONS FOR RESURFACING

Whilst orthopedic surgeons will continue to debate the merit of patella resurfacing in total knee replacement (TKR), there is no doubt that information worldwide from the registries shows the revision rate is lower in patients whose primary TKR includes patella resurfacing. The clinical results are the same (1,2). The epidemiology of failure mechanisms is changing as new implants, technology, and surgical techniques evolve.

OUR OBJECTIVES WITH RESURFACING

The goals when resurfacing the patella are to create a combined construct of the remaining native patella and polyethylene that is approximately equal to the thickness of the original patella, is well covered by polyethylene and tracks stably within the prosthetic trochlea groove (3).

This article provides the author's technique for patella resurfacing that reliably and consistently creates a construct that is approximately equal in thickness to the native patella prior to the onset of osteoarthritis with the prepared bone surface being approximately parallel to the anterior cortex of the patella.

OUR CHOICE AMONG THE DIFFERENT TECHNIQUES

The two common methods for patella preparation are to use an oscillating saw with or without some form of cutting jig or to use a mill. The disadvantages of the use of a saw relate to the difficulty in observing the anterior patella cortex at the time of cutting so it is possible to remove either too much or too little bone or to cut the patella in the wrong plane removing excessive bone, commonly medially but also distally altering kinematics and causing post-operative pain. Whilst experienced surgeons may be confident that they can consistently prepare the patella in a satisfactory manner, inexperienced surgeons will find milling easy to master and safer and it is also much easier option when there is substantial patella bone stock loss.

Two types of milling systems are available, inlay and onlay:

- Onlay milling involves the use of a jig clamped to the patella with a circular cutting guide which surrounds but does not clamp directly on the patella. There is more freedom of movement of the patella within the clamp particularly when it is difficult to match the guide to the patella size. An asymmetric patella may result and for these reasons,

onlay milling is not recommended.

- Inlay milling carries the theoretical disadvantage that the implant is placed at the site of milling. The milling jig is placed on the patella in the position of greatest stability of the jig and this is often more lateral than the ideal position on the medial edge of the patella. Accordingly, the author prefers the technique of positioning the inlay milling jig where it is most stable, often slightly more lateral and proximal to the eventual position. Once inlay milling is completed to the selected plane and depth, the surrounding rim of

bone can be removed with a combination of double action bone rongeurs and an oscillating saw producing a flat surface. The patella drill and sizing guide can then be positioned on the surface as desired, usually on the medial margin.

OUR TECHNIQUE: SURGICAL INLAY TECHNIQUE

1) Soft tissue around the patellar is first cleared (figure 1a) and patella thickness is measured using caliper (figure 1b).

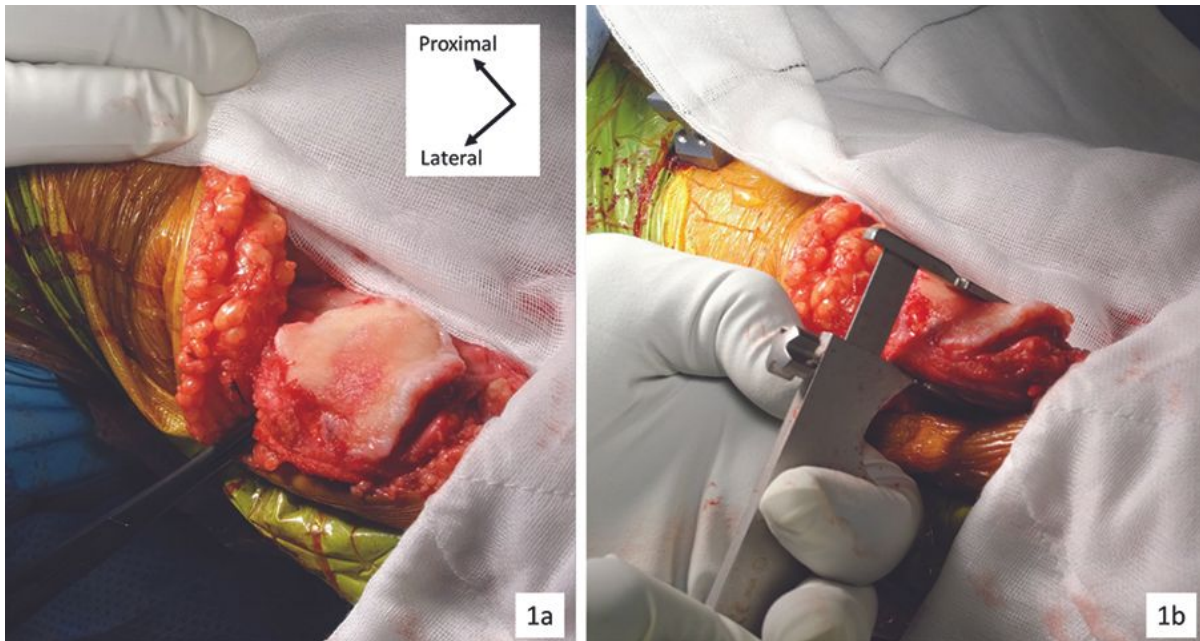


Figure 1: Patella eversion (1a) and measuring initial thickness (1b).

2) Proximal to distal patella symmetry is evaluated by palpation and flattened where necessary with an oscillating saw which is also utilised to perform a small oblique lateral patella facetectomy (figure 2). This deepens the position of the teeth on the lateral side of the inlay capture ring to ensure that the patella surface is milled close to parallel to the anterior surface or slightly thicker medially.

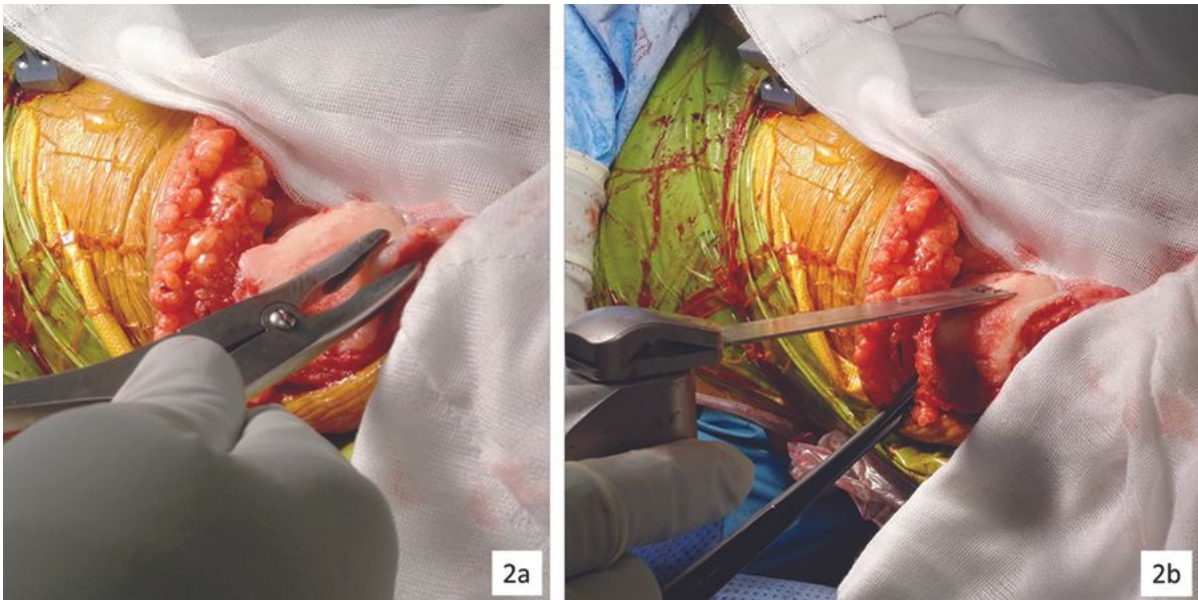


Figure 2 : Patella preparation: Osteophytes resection (2a) and oblique lateral patella facetectomy (2b).

3) The largest size capture ring that is innately stable is positioned on the patella (figure 3a) and after is secured to the patella with a clamp (figure 3b). It is important to ensure the teeth of the capture ring sit down on the patellar surface. The medial and lateral position of the teeth represents the depth of the mill. The ring has a concave cross section when viewed from the sunrise position and is asymmetrical in order to mirror the cross-sectional shape of the patella with the apex of the concavity being 1/3 of the way across the patella. This must be borne in mind when the patella is everted medially with a lateral approach for a valgus knee. The position of the capture ring is determined by its stability against the patella and this is usually not the ideal position for the implant.

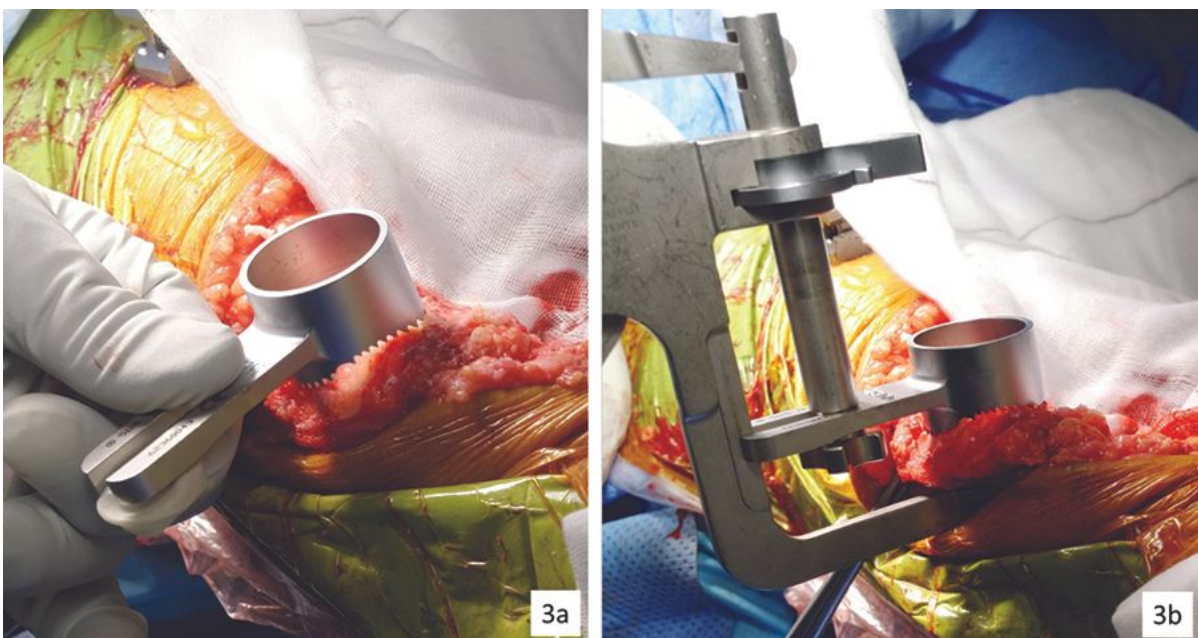


Figure 3 : Capture ring positioned (3a) and secured with a clamp (3b).

4) The system includes variable depth stops to ensure the correct amount of bone remains and the system may also include a depth stop responding to the amount of bone removed (figure 4). Residual bone thickness will vary depending on the size of the native patella and the implant with the goal of restoring correct patellar thickness for the size of the patient, commonly to somewhere between 22-28mm. In order to prevent

patella fracture, the remaining bone should be above 15mm in thickness and lateral release should be avoided (4).

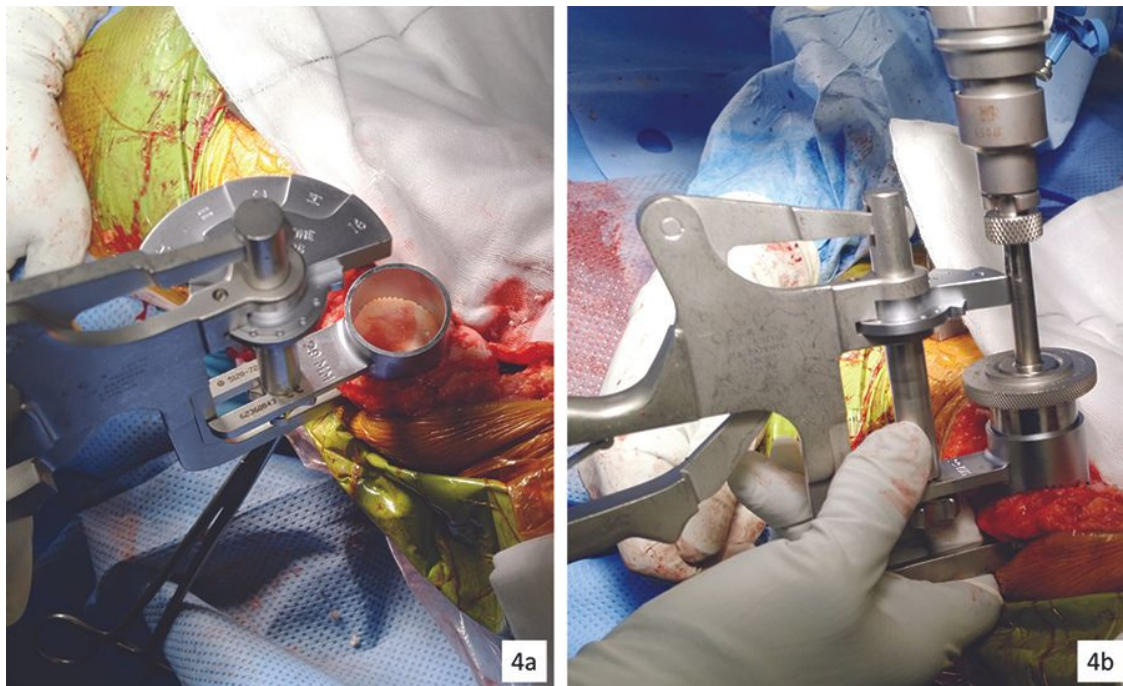


Figure 4 : Estimate of the amount of bone remaining (4a) and milling (4b).

The authors remove the remaining rim of bone with bone rongeurs and oscillating saw (figure 5). Trials are utilised to obtain the largest implant that does not overhang and is sited on the medial edge.

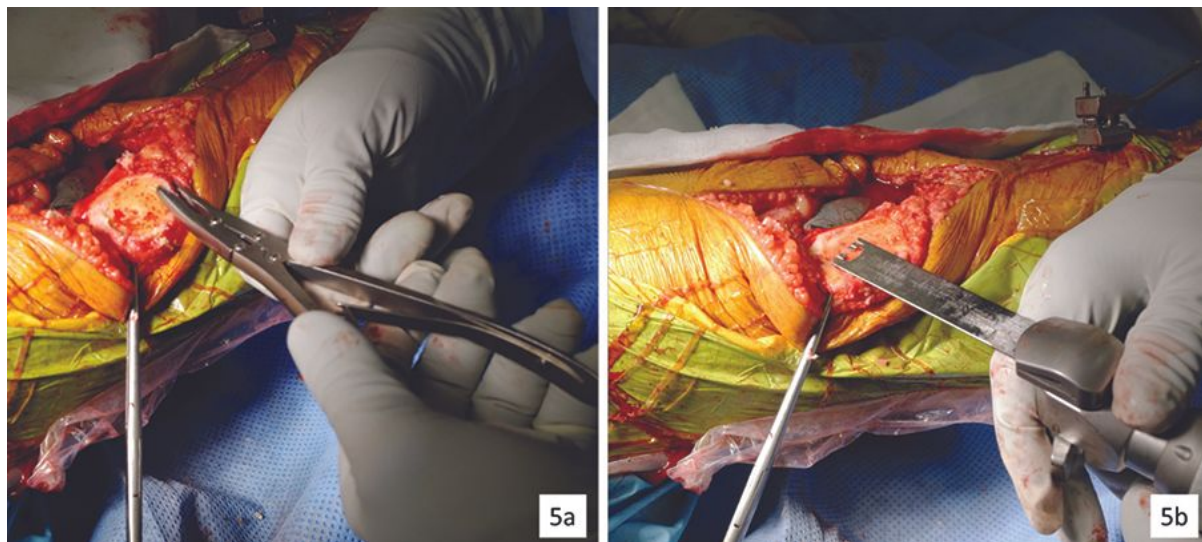


Figure 5 :Removing the remaining rim of bone with rongeurs (5a) and saw (5b).

Holes for the pegs on the patellar component are then drilled (figure 6).



Figure 6 : Drilling for patellar component pegs.

After the application of the trial component, the total thickness is controlled and tracking observed (figure 7). The authors expect to see the medial edge of the patella articulating with the medial trochlea at 30° of flexion before any capsular sutures are inserted. Lateral release is rarely necessary.

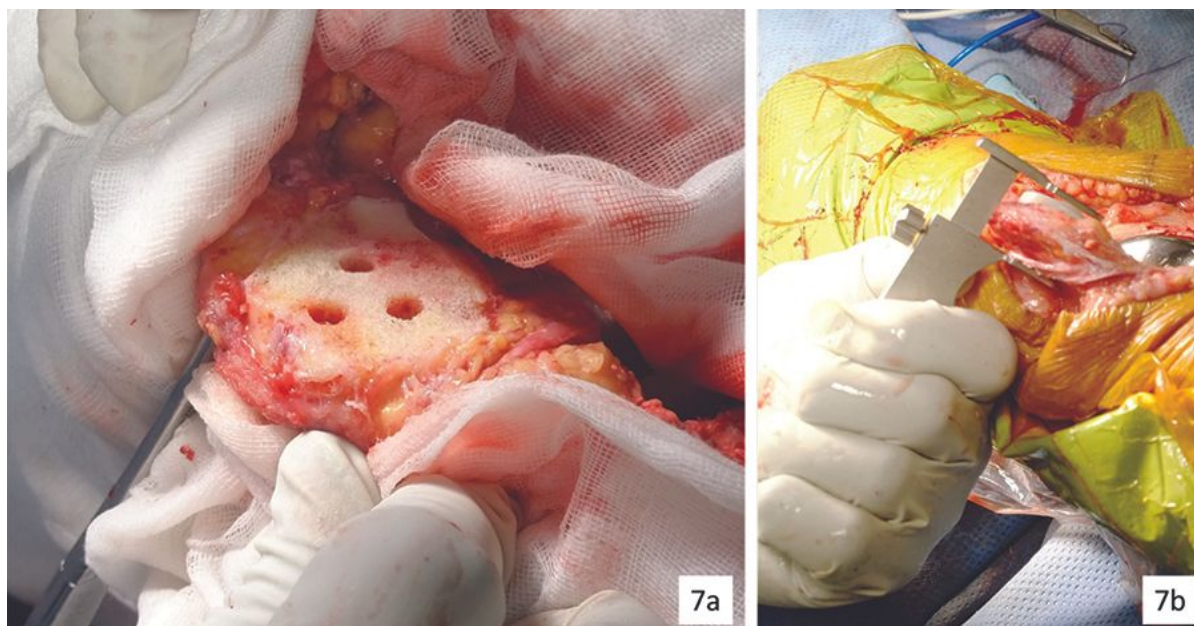


Figure 7 : Final view (7a) and construct thickness conformation (7b).

Lateral release is rarely necessary. After these verifications the definitive patellar implant is cemented.

CONCLUSION

In conclusion, we resurface the patella for every TKR. We choose inlay milling to prepare the patella as it is an easy, reproducible, and safe technique which allows us to position the implant precisely and restores an almost anatomic patellar course.

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