Deepening Femoral Trochleoplasty

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Introduction

With the exception of the trochleoplasty, the management of episodic patellar dislocation (EPD) has been described in the previous chapter. Although trochlear dysplasia is the primary problem in EPD, addressing the principal factors of a high tibial tuberosity to trochlear groove distance (TT-TG) and patella alta is usually sufficient to obtain stability. Trochleoplasty is a technically demanding procedure that is rarely required in our daily practice (once or twice per year), despite the encouraging recent results in the literature. Its indications include patients with habitual dislocation of the patella (Fig. 34.1), abnormal patellar tracking, or in revision surgery. It can correct grade 4 dysplasia with a femoral groove prominence of >6 mm. It is always combined with another surgical procedure to correct the other contributing factors of the instability.

The Principals of the Deepening Trochleoplasty

H. Dejour and G. Walch believed that the primary problem in trochlear dysplasia is a prominent trochlea floor that causes it to be flat. The technique therefore consists of a deepening trochleoplasty (Fig. 34.2). This improves engagement of the patella in the trochlea groove in the early degrees of flexion.

Incision

The trochleoplasty is performed using an anteromedial approach. Following an anteromedial arthrotomy, the patella is everted.

Planning

The key to performing a successful trochleoplasty is precise intra-operative planning. Elevation of the synovium on the anterior cortex of the distal femur is performed to expose the proximal edge of the trochlear groove. A marker pen is then used to define the center of the new groove, extending from the proximal edge of the trochlea to the center of the notch. The medial and lateral facets are then marked (Fig. 34.3).

Fig. 34.1 Habitual dislocation of the patella

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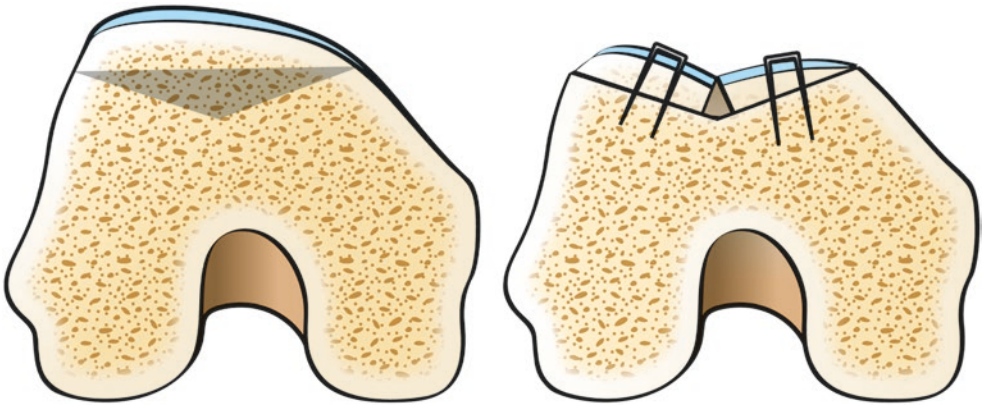

Fig. 34.2 The deepening trochleoplasty

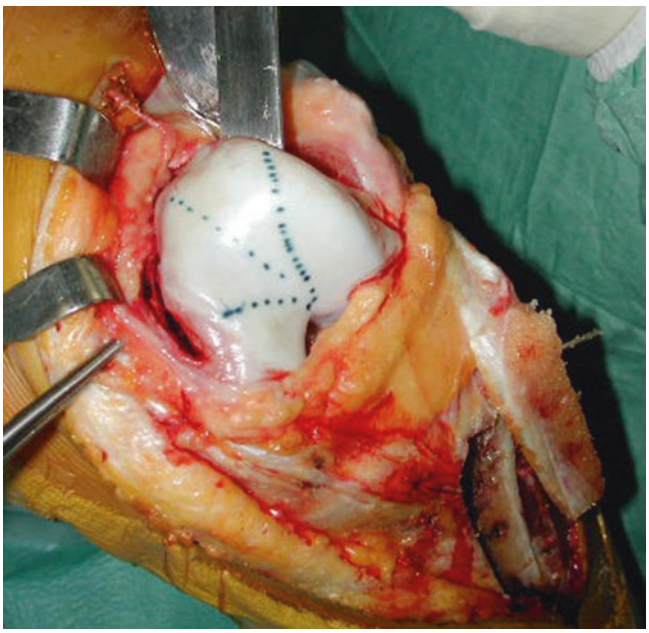

Fig. 34.3 Intra-operative planning of the trochleoplasty

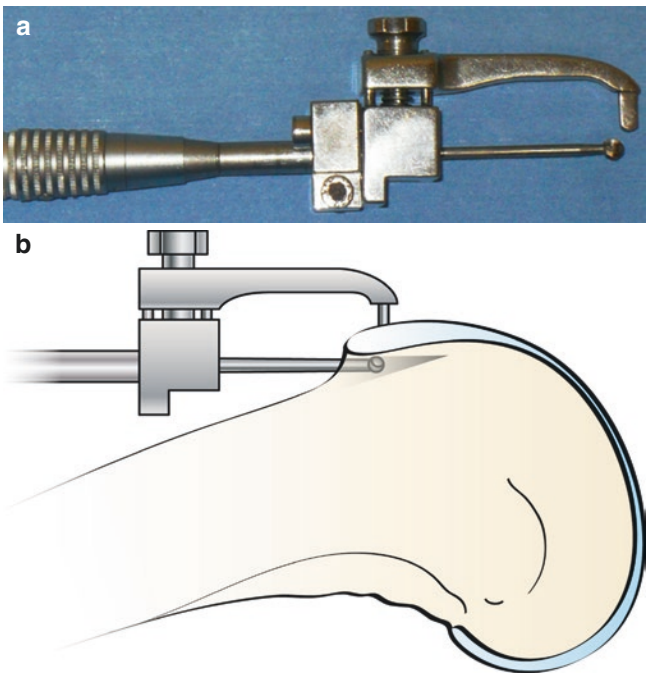

Fig. 34.4 (**a**, **b**) The power burr

Deepening

Once the walls of the trochlea have been exposed, periosteal stripping is performed around the periphery. A 10 mm osteotome is then used to remove cortical bone around the periphery of the trochlea; from the proximal edge and lateral/medial walls (Fig. 34.3). This forms a 3–4 mm trench which exposes the underlying cancellous bone.

A power burr (Fig. 34.4a, b) equipped with an adjustable stylus is now used to complete the deepening trochleoplasty. It is used to determine the appropriate resection depth, avoid penetration of the cartilage, and avoid damage to the cartilage due to heat generation. A minimum residual thickness of about 4 mm consisting of cartilage and a thin layer of subchondral bone is recommended to achieve a bone surface that will be easy to fashion. The remaining cancellous bone is removed using a small curette. The cancellous bone bed should extend as far as the roof of the femoral notch. Once proper trochlear depth has been achieved, attention is directed to the preparation of the medial and lateral facets.

Trochleoplasty

A cut is made in the middle of the trochlear groove using a scalpel (Fig. 34.5). The line of the cartilage incision has been previously marked with a sterile pen, and the cartilage weakened with a 2 mm diameter drill along the marked line. This allows bone shell impaction into the new sulcus. The new facets are then fixed with two metal staples at its upper end (Fig. 34.6). Patellar tracking is checked again. Fixation continues to be an area for improvement. We sometimes also use 3 mm AO screws, and remove them arthroscopically at 6 months post op.

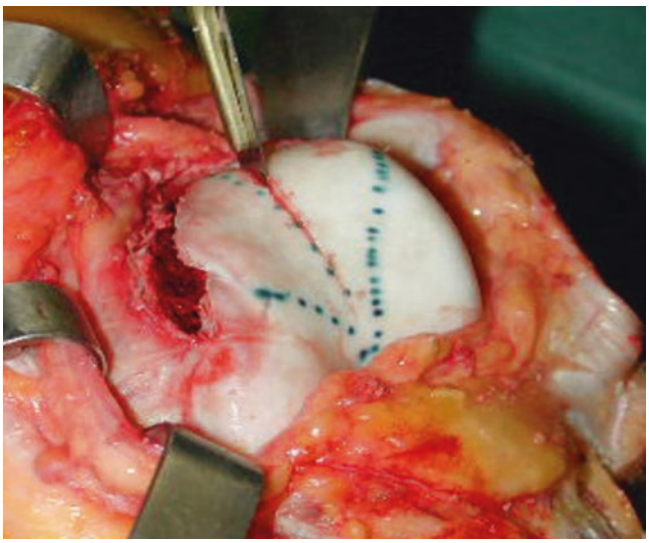

Fig. 34.5 A cut is made in the middle of the trochlear groove using a scalpel

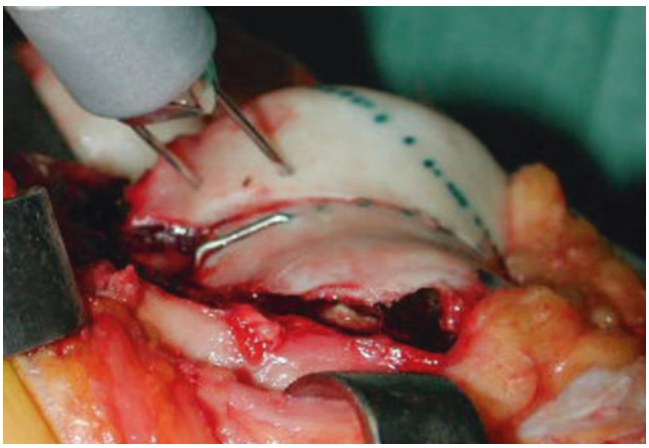

Fig. 34.6 Fixation of the trochleoplasty

Closure

The synovial tissue is then sutured back onto the edges of the trochlea. The staples can be easily removed (usually at least 3–6 months later) under arthroscopy.

Post-operative Care

The rehabilitation protocol is dictated by whether the trochleoplasty was combined with a distal transfer or medialization of the tibial tubercle (TT). In the absence of surgery to the TT, immediate weight bearing with no restriction of movement is allowed. In the presence of a distalization or medialization of the TT, flexion is limited to 95° for 45 days. Flexion beyond 95° is allowed once consolidation has been achieved (Fig. 34.7a, b).

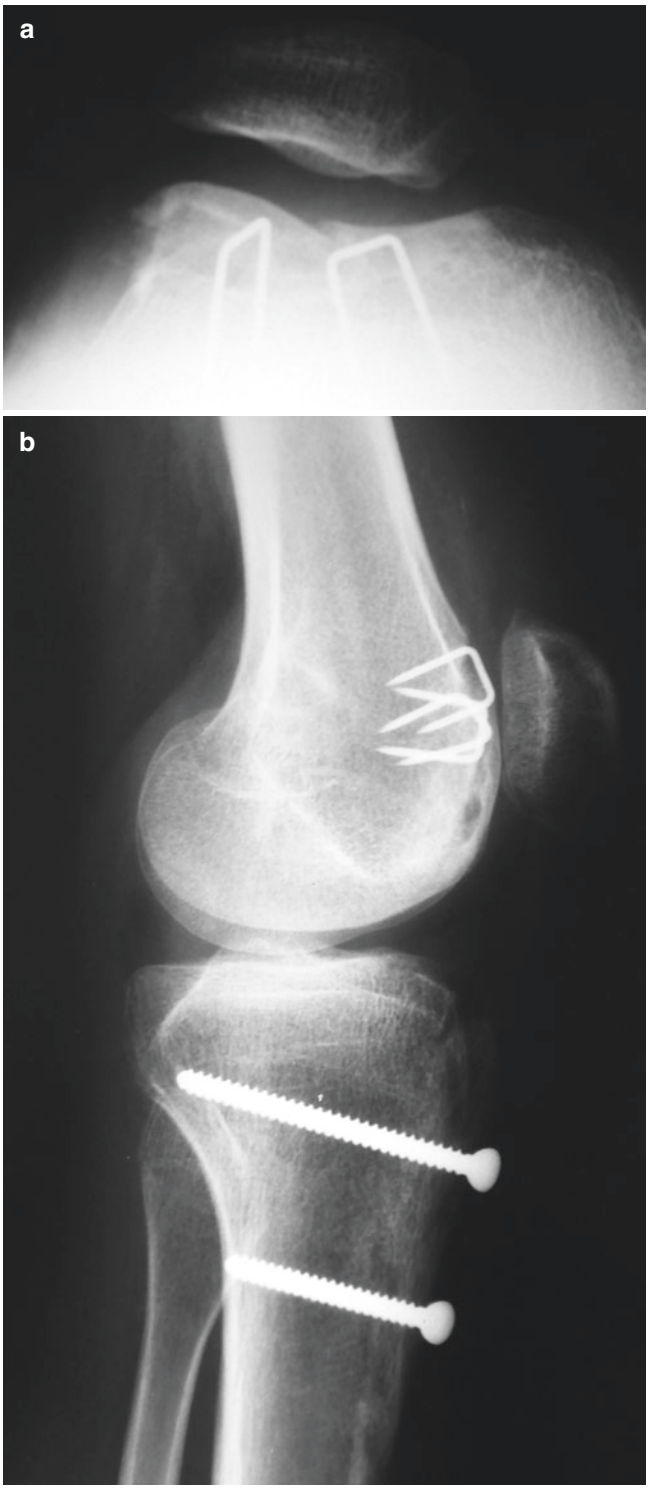

Fig. 34.7 (**a**, **b**) Post-operative X-ray

Reflections on the Deepening Trochleoplasty and Future Directions

The greatest concern in the development and use of this technique over the past 20 years has been the risk of necrosis to the cartilage of the trochlea. Over this period, the technique has changed little due to the lack of industrial support and the little time invested by surgeons to improve it. This is unfortunate as this technique addresses the principal abnormality found in EPD. Its reproducibility and accuracy could be optimized by computer-assisted surgical techniques, and this would be an ideal indication for robotically assisted surgery. The intended location and dimensions of the new trochlea could be planned with accuracy, and the intra-operative stages performed to exactly match the plan, minimizing risk to the chondral surfaces. However, at present due to the technical demands of the conventionally performed procedure, there remains a reluctance to perform this surgery.

Alternative Procedures

An alternative approach to dealing with the femoral groove prominence typical of severe dysplasia is the "Recession Trochleoplasty," described by D. Goutallier and popularized by Beaufils. A proximally based wedge of bone is removed from the distal femur, allowing the prominence to be "recessed" to the level of the anterior femoral cortex. The hinge point is the distal trochlea. It is fixed with two screws just lateral to the chondral surfaces (Fig. 34.8a, b).

Although the shape of the trochlear groove is not improved in the axial plane, accordingly the patellar femoral congruence is not changed, and there is less intra-operative risk of injury to the chondral surfaces.

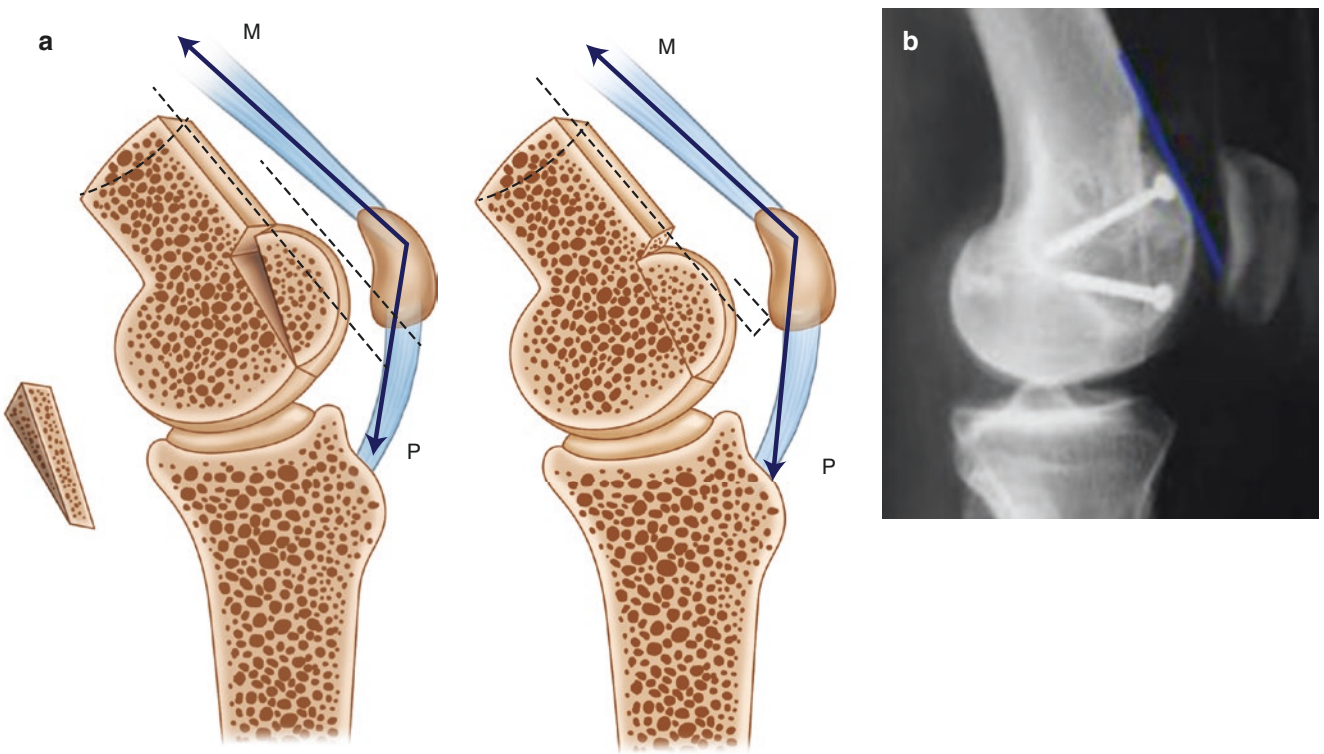

Fig. 34.8 (**a**, **b**) A closing wedge osteotomy of the distal femur in the coronal plane allows the trochlear prominence to be recessed to the level of the anterior femoral cortex