The anterior femoral cut has a 3 dimensional effect on the orientation of the femoral component in PFA

Kinematic Replacement:
In uni compartmental replacements the aim should be to do a kinematic replacement, respecting the rotational axis, ligament tension and the vector directions.

Principles for a successful PFA
The soft tissue tension and length should not change.
1. Maintain the trochlea groove angle in coronal and axial plane
2. Maintain the joint line
3. Respect the rotational axis
4. Other requisites
   4.1 Smooth articular cartilage transition
   4.2 No prosthetic overhang
   4.3 No intercondylar impingement

There are three variables in PFA

1. Patient variables
   1.1 This is a given and that can only be changed within a narrow band
2. Prosthetic variables
   2.1 Huge variation between the different designs
   2.2 No variations within a specific design, except for size
3. Surgical variables – this is really the only manageable variable
   3.1 Anterior femoral cut
      3.1.1 Height
      3.1.2 Rotation
         - Sagittal
         - Axial
   3.2 Soft tissue
      3.2.1 Release
      3.2.2 Plications
   3.3 Tubercle osteotomy

Correct orientation of the trochlear groove:
In TKR’s there is no concrete evidence that the rotation of the femoral component has an effect on patella tilt and patella displacement (Heesterbroek¹).
In some cases external rotation might have a negative effect on patella tilt (Merican²)

External rotation will lower the lateral condyle decreasing tension on the lateral soft tissue and increase tension on the medial soft tissue; internal rotation will have the opposite effect.
If the lateral condylar height is excessively lowered it might result in lateral patella subluxation. Within certain limits the trochlear groove lies in the orientation and direction of the main extensor force over the knee (Thienpont\textsuperscript{3}) (Wright\textsuperscript{4}). In most dysplastic trochleas there is less external rotation in the axial plane and less valgus in the coronal plane (Cho\textsuperscript{5}). In some cases the trochlea is internally rotated and in varus.

In PFA, in contrast to a TKR, the rotational position of both the femur and tibia are unchanged and the PFA has to fit into this natural rotation of the patient. In a PFA the orientation of the prosthetic groove is dependent on the design of the prosthesis and the orientation of the anterior femoral cut. There is a variation from 13.5°valgus to neutral in the commercial available prosthesis (Saffarini\textsuperscript{6}) When performing a PFA we prefer to keep the orientation of the groove within +/- 3°degrees of the original alignment.

**All the principles for as successful PFA are directly influenced by the anterior femoral cut:**

1. **Internal / external rotation of the cut**
   1.1. External rotation of the anterior cut will distalize the lateral femoral flush line and proximilize the medial femoral flush line and vice versa. A smooth articular cartilage prosthesis transition is mandatory and in achieving this the proximal/distal cut line on the medial and lateral femoral condyles influences the varus/valgus orientation of the trochlea groove. External rotation of the anterior femoral cut will increase the trochlea groove angle towards valgus; while internal rotation of the femoral cut will decrease valgus towards a varus aligned groove angle.
   1.2. Rotation of the anterior femoral cut effects the amount of overhang, especially in the dysplastic or absent medial condyle trochlea dysplasias like Dejour type C and D. Increasing external rotation will improve the situation against the cost of increasing the valgus. It is not recommended when the natural groove is in varus or neutral; in these cases the use of a smaller size prosthesis or a prosthesis with smaller medial side might be a better solution than increasing external rotation

2. **Amount of flexion/ extension of the cut in the sagittal plane**
   2.1. A smooth transition between the prosthesis and surrounding articular cartilage should be achieved medially, laterally and distally
   2.2. This is dependent on the close relation between the original trochlea radius and the radius of the prosthesis. Increasing or decreasing the sagittal slope of the anterior femoral cut can to some extend compensate for a mismatch of the radii

3. **Height of the cut in relation to the anterior femoral cortex**
   3.1. No overstuffing of the anterior compartment. Changing the thickness of either the femoral or patella components will have an effect on the soft issue tension
   3.2. Similar to TKR the aim should be to keep the joint line in the original position. The patella might however be very small and thin making it impossible not to elevate the joint line
   3.3. There should be about 2-3mm space between the distal lip of the prosthesis and the top of the notch. This depends on the size of the prosthesis and the
length of the distal lip and on the height of the anterior femoral cut in relation to the anterior femoral cortex

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