TKA Gap Planning

The NAVIO TKA Gap Planning stage helps you adjust the plan based on gap information between the femur and tibia implants.
Interactive Views
Four interactive views for translating and rotating the components with respect to the patient’s virtualized joint.

Extension/Flexion View
The Extension and Flexion viewscreens display two discrete points; one for the medial compartment and one for the lateral compartment with values displayed in millimeters of gap or overlap.

For extension, the discrete points represent the values collected at 0° during Stressed ROM.

For flexion, the discrete points represent the values collected at 90° during Stressed ROM.

Magnitude of gap or overlap is represented by the height of the left and right edges of the graph.
**Gap Graph**

- The y-axis indicates gap (+) or overlap (-) in millimeters.
- The x-axis indicates the range of motion throughout flexion in degrees.
- The vertical blue line indicates the angle at which the patient's neutral position was collected.
- Use the implant position controls to change the position in order to reduce and balance the gap between the medial and lateral compartments.
- Toggle the right two viewscreens to the sagittal plane of view by pressing the Rotate View arrow button.
- The gap graph created from the Stressed ROM Collection stage can be viewed in Extension and Flexion, or throughout the entire range of motion by using the Gap Graph toggle button.

**Full ROM View**

- A line graph is presented with two lines plotted. The medial compartment (orange line) and lateral compartment (purple line) gaps are plotted throughout flexion.
- The y-axis indicates gap (+) or overlap (-) in millimeters.
- The x-axis indicates the range of motion throughout flexion in degrees.
Gap Planning Workflow and Approach

Steps

1. Manipulate the position and orientation of the implant components such that the resulting extension and flexion gap graph is approximately 2 – 3mm above the zero line.

2. Balancing the flexion gap in the medial and lateral compartments can be performed by rotating the femur component internally or externally.
   - To balance extension gaps, manipulate the superior-interior positioning of the femur component.
   - To balance gaps in both flexion and extension, manipulate the tibia resection level or adjust insert size.
   - To balance flexion gaps, manipulate the femur sizing and position, keeping in mind that AP adjustments and component rotation will require re-evaluation of notching criteria on the femur bone surface. Use the Rotate View button to toggle between sagittal and frontal views in this stage.

3. Confirm that the implant resection is appropriate for the femur and tibia in extension as well as flexion. Confirm the anterior transition of the femur implant to avoid notching and confirm tibia slope for gap balancing.

Tips

- Adjustments to femoral component rotation should be carefully considered relative to prior parameters such as fit to the bone and anterior notching.

- Adjustments to femoral flexion should be carefully considered against prior considerations regarding anterior fit and alignment to the intramedullary (IM) axis.

- If ligament releases are performed after bone preparation, then the focus should be on the gap of the looser condyle in extension as a ligament release would open up the tighter compartment post implant placement.

- Making ligament releases after bone cuts may affect both extension and flexion gaps. This should be factored into the pre-bone cut laxity assessment, when considering balancing the extension and flexion joint space.
Ligament Balancing Adjustments

**Flexion and Extension**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance is tight in extension and flexion.</td>
<td>Move tibial component inferior and/or reduce thickness.</td>
</tr>
<tr>
<td>Balance is loose in extension and flexion.</td>
<td>Move tibial component superior and/or increase thickness.</td>
</tr>
<tr>
<td>Balance is tight in extension and loose in flexion.</td>
<td>Move femoral component superior. Increase the femoral component size.</td>
</tr>
<tr>
<td></td>
<td>-or- Reduce femoral component flexion.</td>
</tr>
<tr>
<td>Balance is tight in flexion and loose in extension.</td>
<td>Downsize the femoral component, or move it anterior.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The femur implants are anterior referenced. Upsizing or downsizing the components does not change the anterior cut from the plan, unless the component is moved by the user.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Exercise caution when anteriorizing or posteriorizing the femur component as it would affect the anterior transition of the component on bone, and evaluate for notching.</td>
</tr>
<tr>
<td></td>
<td>Move the femur component inferior to tighten the extension gap.</td>
</tr>
<tr>
<td></td>
<td>-or- Increase posterior slope of tibial component.</td>
</tr>
</tbody>
</table>

**Flexion**

- Balance is loose in the medial compartment in flexion. Internally rotate the femur implant to balance gap in the medial and lateral compartments.
- Balance is tight in the medial compartment in flexion. Externally rotate the femur implant to balance gap in medial and lateral compartments.

**Extension**

- Balance is loose in the lateral compartment in extension. Plan with the lateral gap (if not performing medial collateral ligament release at this stage) in order to balance the medial and lateral gap in extension. Move the femur component inferior in extension, to tighten the gap presented.
- Balance is tight in the lateral compartment in extension. Plan with the lateral gap (if not performing lateral collateral ligament release at this stage). Move the femur component superior in extension, to loosen the extension space.
- The medial and lateral compartments are not balanced in extension. The component default rotation in varus/valgus is 0° to ensure a perpendicular distal cut with respect to the femur mechanical axis. To balance the medial and lateral space in extension, re-collect ligament stress in extension, after performing medial-collateral ligament release.

*Be sure to stay within standard surgical practices of ±3 degrees for V/V, Slope*