Altered sensation over the front of the knee following surgery.

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Introduction
An alteration in anterior knee skin sensation is a common and acceptable consequence of knee arthroplasty, but it has received little attention in the literature. Altered skin sensation is unpleasant for many patients and may affect function, especially kneeling. Surgical incisions aimed at sparing small cutaneous nerves of the thigh have been associated with preservation of skin sensation following TKR and may improve kneeling ability following arthroplasty. The purpose of this study was to compare postoperative alteration of skin sensation in four incision types after total (TKR) and unicompartamental knee replacements (UKR).

Materials and Methods
Overview
EIGHTY-seven knees from eighty patients (44M/43F), mean age 65±8.8 years (range 40-83yrs), were assessed for sensation to pin-prick and light touch following TKR or UKR. Of the 87 knees tested, 38 had TKR and 49 had UKR for diagnosis of osteoarthritis. Incision length, time since surgery and kneeling ability were also recorded and compared to measures of sensation.

Surgical incisions. Long anteromedial or midline incisions were used in TKR and standard short medial or minimally invasive incisions were used in UKR (Figure 1). Seventeen patients had long anteromedial, 21 midline, 40 standard short medial, and 9 MIS incisions.

Figure 1. Grid system used to map sensory alterations of the anterior knee following knee arthroplasty. 1=medial cutaneous nerve of the thigh, 2=infra patella branch of saphenous nerve, 3=anteromedial cutaneous nerve of the thigh, 4=lateral cutaneous nerve of the thigh, 5=long anteromedial incision (TKR), 6=midline incision (TKR), 7=standard short anteromedial incision (UKR), and D=minimally invasive incision (UKR).

Sensory testing. Sensation of the anterior knee to pin-prick and light touch was recorded on a scale ranging from -2 to +2, where, -2=absent sensation, -1=hypoesthesia, 0=normal, +1=sensitivity and +2=hypersensitivity. Surface area and distribution of sensory alteration was mapped using a gridded plastic film placed over the anterior knee of each patient (Figure 1). Data was then transferred to a custom built computer program for subsequent analysis.

Kneeling ability. An area of kneeling was defined as the area of the tibial tuberosity distally and the proximal pole of the patella with the femoral condyles on either side proximally. Distribution of sensation in the kneeling area was also recorded.

Statistical Analysis. One-way ANOVA was used to compare between incision types and regression analysis for incision length. Significance was set at p<0.05.

Results
Surface area of altered sensation. Hypoesthesia (-1) was the most common sensory finding following knee arthroplasty occurring in 75-100% of all incision types, representing the greatest surface area of sensory change (Figure 2).

Figure 2. Mean surface areas of sensory grades (Gd) for each incision type. Bars indicate standard error.

<table>
<thead>
<tr>
<th>Sensory Grade</th>
<th>Able to kneel (n=26)</th>
<th>Unable to kneel (n=61)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>17.0±29.4</td>
<td>10.4±24.7</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>-1</td>
<td>38.5±30.8</td>
<td>41.3±31.7</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>+1</td>
<td>19.0±15.7</td>
<td>0.8±3.1</td>
<td>0.01</td>
</tr>
<tr>
<td>+2</td>
<td>6.8±15.7</td>
<td>0.13±1.0</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Table 1. Surface area (cm²) of sensory alteration in patients able and unable to kneel following knee arthroplasty.

Discussion
Altered sensation is experienced following knee arthroplasty and predominantly results in diminished sensation. These results indicate that sensory changes following arthroplasty are influenced by incision type, length and recover with time. Patients developing painful hypersensitivity of the anterior knee have an impaired kneeling ability related to pain and not incision type.

Conclusions
Long anteromedial-incisions and length of incision play an important role in sensory changes following knee surgery. Attempts should be made to perform shorter and more lateral incisions to avoid damage to important sensory nerves of the anterior knee to optimise maximum post-operative knee function.

References