01000011 01101000 01100001 01110000
01110100 01100101 01110010 00001010
00110011 00101110 00110011 00101110
00110011 00001010

Chapter 3.3

Inter-surgeon variation in skin incisions for tibial nailing in relation to the infrapatellar nerve

A.L.A. Kerver, M. Leliveld, H.P. Theeuwes, M.H.J. Verhofstad, G.J. Kleinrensink.

Injury extra. 2010 Oct 26.

INTRODUCTION

Intramedullary nailing of the tibia has become the standard therapy for tibial shaft fractures. One of the most common complaints after this procedure is chronic anterior knee pain. This phenomenon is not yet elucidated, but might be associated with iatrogenic injury to the infrapatellar nerve. Damage of this nerve causes sensory disturbances in its area of distribution and also neuroma formation has been described. Although various surgical approaches of the entry point in the proximal tibia have been proposed, no consensus exists regarding the surgical-anatomical landmarks for a safe approach of the medullary canal.

Objective

To visualize the inter-surgeon variation in skin incisions for tibial nailing and to map the surgical anatomy of the infrapatellar nerve.

MATERIALS AND METHODS

Dutch trauma surgeons and residents (n=16) were asked to draw an incision for tibial nailing on different embalmed human knees. Incision placement was expressed in relation to these anatomical landmarks: the upper and lower edge of the patella, the tibial tubercle and the medial and lateral edge of the proximal tibia (Figures 1 and 2). Finally, the infrapatellar nerves of ten different cadaver knees were dissected and marked. All knees were digitally photographed and analysed using Computer Assisted Surgical Anatomy Mapping(CASAM),a new software tool that is able to depict all drawn incisions and all dissected infrapatellar nerves on real cadaver legs into one computed leg with standard dimensions.

RESULTS

On average trauma surgeons performed 5 (0–15) tibial nailing procedures per year and had 4.7 (0–16) years of experience. Form and place of the incisions were highly variable. Surgeons that performed five or more procedures per year mainly made a central incision whilst surgeons that performed less than five approaches per year showed more variation in incision placement (Figure 1). The variation in the topographic anatomy of the infrapatellar nerve was high, but it was mainly located medial of the patella and patellar tendon. Branching of the

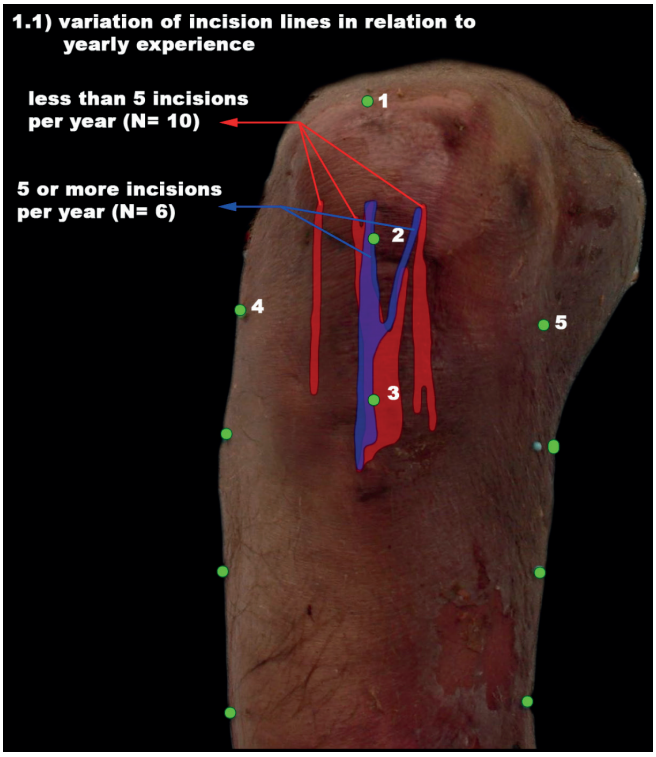

Figure 1. Variation of incision lines in relation to yearly experience.
With CASAM computed right knee with average dimensions; 1=patella top, 2= patella tip (distal), 3= tibial tuberosity, 4= lateral tibia plateau, 5= medial tibia plateau.

nerve occurred caudal to the patella and far most branches crossed the patellar tendon. Of 16 incisions drawn, only the lateral incision (n=1) would not have damaged an infrapatellar nerve branch. In the central incisions (n=10) and mainly in the medial incisions (n=5) the dissected infrapatellar nerves would have been at risk for transsection (Figure 2).

CONCLUSIONS

The variation between surgeons of the skin incision for tibial nailing appears highly variable. The infrapatellar nerve is at risk for iatrogenic damage in all vertical incisions except if performed lateral to the patella tendon. Oblique or horizontal approaches seem good alternatives to prevent iatrogenic nerve injury.

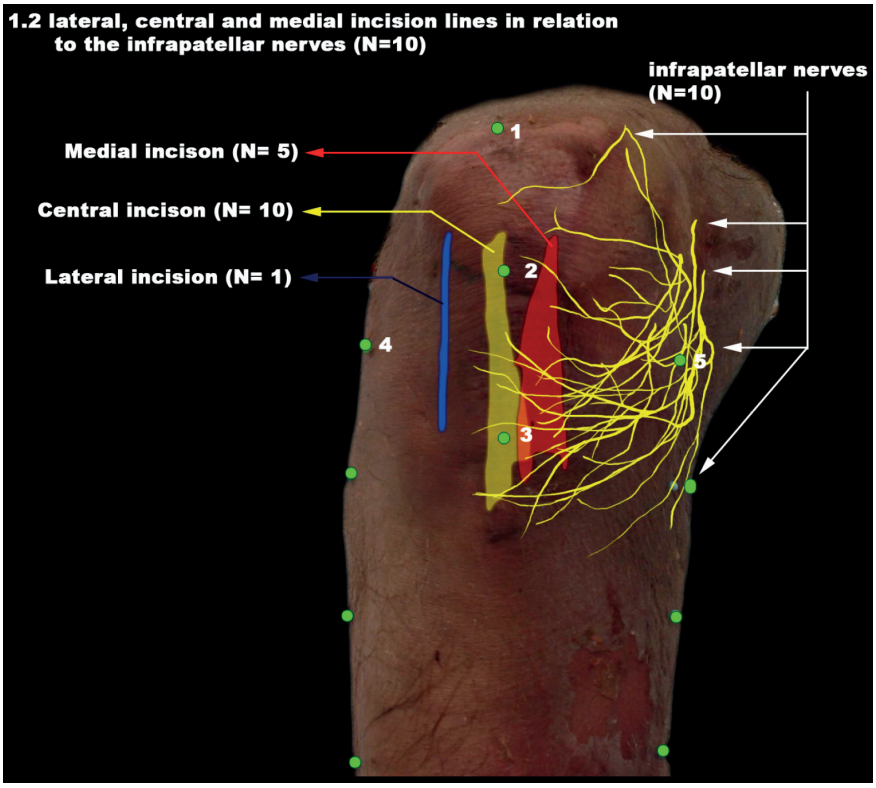

Figure 2. Lateral, central and medial incision lines in relation to the infrapatellar nerves (N=10) With CASAM computed right knee with average dimensions; 1=patella top, 2= patella tip (distal), 3= tibial tuberosity, 4= lateral tibia plateau, 5= medial tibia plateau.