Commentary

Branching pattern of the lateral femoral cutaneous nerve at the proximal thigh: a commentary on a recent published cadaveric study

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In a recent article published in *The Journal of Bone and Joint Surgery*, Rudin *et al.* (1) reported a very interesting and useful observation of the anatomical course of the lateral femoral cutaneous nerve (LFCN), with special attention to the direct anterior approach (DAA).

The DAA for hip pathology was first described by Hueter in 1883 (2). The DAA is an intermuscular and internervous approach without muscle transection that enables the surgeon to reach the hip joint using the distal part of the Smith-Petersen approach without muscle detachment (2). This approach was initially performed for developmental hip dysplasia, fractures of the hip, and femoro-acetabular impingement (3), and was later applied to hip arthroplasty with a traction table and small acryl implant by the Judet *et al.* (4). Recently, the DAA for total hip arthroplasty (THA) is gaining in popularity because of its perceived earlier postoperative recovery and lower dislocation rate (3-5). However, the DAA is associated with a higher incidence of complications, especially in the learning curve period (6,7).

LFCN injury is a complication specific to the DAA for THA. So far, LFCN injury in the DAA has not been focused on in either the literature or in daily practice. However, due to the growing popularity of the DAA, a number of articles focusing on LFCN injury in the DAA have recently been published (6-9).

Epidemiological studies have revealed the incidence rate of LFCN injury, although this rate has varied greatly due to the use of different investigation methods (6,8-10). Restrepo *et al.* (9) reported a very low incidence of LFCN injury of 2% in the DAA for THA. In contrast, Goulding *et al.* (10) reported a high incidence of LFCN injury of 67% using self-reported questionnaires; however, due to their evaluation method, LFCN injury was likely to be overrepresented due to the confounder of peri-incisional sensory changes (10). Therefore, Homma *et al.* (6) evaluated the use of self-reported questionnaires, with the exception of patients with symptoms around the wound to increase the specificity. Consequently, they reported LFCN injury in 31.9% of patients who underwent the DAA for THA at an average of 12.8 months postoperatively (6). We consider that these variations in the reported incidence of LFCN injury in the DAA for THA are the result of differences in diagnostic accuracy (such as sensitivity and specificity) caused by study design (prospective or retrospective) and method of diagnosis (subjective or objective).

Although epidemiological studies have contributed to the knowledge of LFCN injury in the DAA for THA, clear evidence on how to prevent LFCN injury has not yet been shown. We think that this lack of a prevention method originates in the lack of knowledge of the LFCN anatomy. Several articles related to the anatomy of the LFCN have focused on the level of the anterior superior iliac spine, as the lateral decubitus or prone position may cause LFCN injury at the anterior superior iliac spine. However, when we consider that the DAA for THA is conducted in the supine position, it is more important to understand the LFCN anatomy at the level of the thigh, especially at the incision level of the DAA; this has not yet been well studied.

To understand the anatomy of the LFCN at the thigh level, Rudin *et al.* (1) conducted a cadaveric study to examine the branching pattern of the LFCN, with special consideration of the DAA. They found that the

LFCN consistently coursed within the deep layer of the subcutaneous fat tissue (1). And, interestingly, they demonstrated three different branching patterns of the LFCN in the proximal aspect of the thigh: sartorius-type (in 36% of the specimens), characterized by a dominant anterior nerve branch coursing along the border of the sartorius muscle with no, or only a thin, posterior branch; posterior-type (32%), characterized by a strong posterior nerve branch; and fan-type (32%), characterized by multiple spreading nerve branches of equal thickness (1). Rudin *et al.* (1) reported that injury to branches of the LFCN cannot be avoided in the fan-type, as multiple nerve branches of equal thickness spread over the anterolateral region of the proximal aspect of the thigh, crossing over the tensor fasciae latae muscle and the lateral border of the sartorius. They concluded that certain injury to the LFCN cannot be avoided in approximately one-third of patients operated on via the DAA (1).

Rudin *et al.* (1) revealed the exact anatomy of the LFCN branches, which is very informative for surgeons in terms of avoiding the LFCN intraoperatively, and also indicates directions for future research. The skin incision should be made as far lateral as possible over the anterolateral aspect of the tensor fasciae latae muscle (1); this was also reported by Oinuma *et al.* (11). A strict subfascial dissection above the tensor fasciae latae muscle fibers will protect the anterior branches of the LFCN, but not the posterior branches. In order to protect the posterior branches, a proximal extension of the skin incision should be limited to the superficial subcutaneous fat layer, and should not enter the membranous layer (1). However, even when these factors are taken into consideration, a certain population will still experience LFCN injury by the DAA (1). Therefore, research should advance to how to prevent and treat LFCN injury. Currently, we have no scientific evidence on how to prevent LFCN injury intraoperatively, and no proven medication for treatment of LFCN injury. We believe that the DAA gives great advantages to both surgeons and patients. Further investigation into LFCN injury in the DAA is warranted to enable greater benefit from the DAA.

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Footnote

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