

Anatomical Variation of Lateral Femoral Cutaneous Nerve around Anterior Iliac Crest in Thais

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Abstract

Background: Lateral femoral cutaneous nerve (LFCN) usually passes along the inner surface of the iliac crest and medial to the anterior superior iliac spine (ASIS). Many orthopaedic procedures that are operated around ASIS may cause injuries to the nerve.

Aim of Investigation: To find out normal variation of the nerve in relationship to the ASIS.

Materials and Methods: The study was carried out as a survey research in preserved 40 Thai cadavers. Dissection was performed on both sides. The ASIS was used as the referent point. The distribution of the nerve was dissected from spinal foramens down to iliac crest, ASIS and at about 5 cm below the spine. Distances between the nerve and the iliac crest and ASIS were measured.

Results: Mean distance between iliac crest and the nerve is 4.52 cm. All nerves ran medial to the iliac crest and inferiorly below the ASIS. In all specimens the nerve passed medial to the ASIS.

Conclusions: Most of the specimens revealed classical nerve distribution while 2.5 % had variation in the course of the nerve so that the nerve might be injured during surgical procedure around the anterior part of iliac crest.

INTRODUCTION

Lateral femoral cutaneous nerve (LFCN) is a sensory nerve that originates from the posterior division of L2 and L3 joining to form the nerve. It runs diagonally from the lumbar vertebral foramen medial to the iliac crest under the fascia of iliacus muscle and emerges between the anterior superior iliac spine (ASIS) and lateral attachment of the inguinal ligament, and then runs superficially and pierces the fascia lata

10 cm. inferior to the inguinal ligament to supply the skin over the anterolateral aspect of the thigh. There are variations of the nerve related to the ASIS and iliac crest that the nerve can be damaged during surgical intervention around ASIS such as applying the external fixator of the pelvis for pelvic fracture or taking bone graft from the iliac crest^{1,2}. Murata reported the chance of nerve injury in 10% during harvesting bone graft. Injuries to this nerve can cause decreased sensation and neuropathic pain around the

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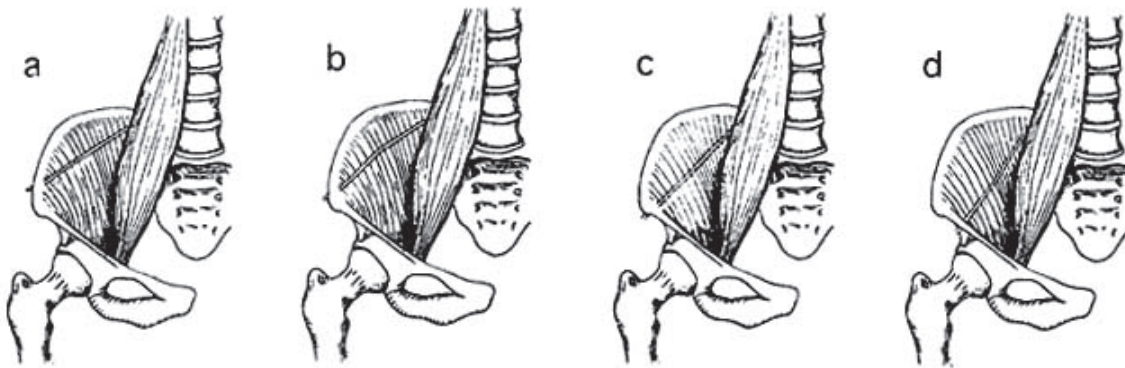


Fig. 1 The variations of the nerve were documented as type A, B, C or D.

anterolateral thigh^{3,4}. To avoid injuries to the nerve, its distribution, course and anatomical variation in Thais were studied.

MATERIALS AND METHODS

In association with the Department of Anatomy, Faculty of Medicine, Siriraj Hospital, Mahidol University, both legs of 40 cadavers were studied. Twenty-one cadavers were male and 19 were female with age ranging from 39-88 years. The mean height of the cadavers was 160 cm. and the mean distance between ASIS was 23.6 cm. (Table 1). The dissection was carried during 21-22 October 2004. After the anterior abdominal wall was opened, the internal organs in the abdomen and the kidneys were removed, the posterior peritoneum was seen, the psoas muscle was cleared to expose the vertebral body. The second and third vertebral bodies were identified and the LFCN of the thigh was identified and tagged.

The nerves were dissected from the intervertebral foramen. Those emerged from the posterior root of L2 and L3 ran diagonally from the posterior of the iliac crest to the ASIS, and ran beneath the lateral attachment of inguinal ligament. The distance from the ASIS to the nerve, regardless of whether the nerve ran beneath or above the ASIS, was measured in centimeter using a vernier caliper. The variations of the nerve were documented as type A, B, C or D as shown in the diagram (Figure 1). The distance between the nerve and the referent point on the iliac crest (the point 5 cm. above the ASIS which is in the area where Steinmann pin would be applied for the treatment of pelvic fracture) was measured and recorded (Figure 2).

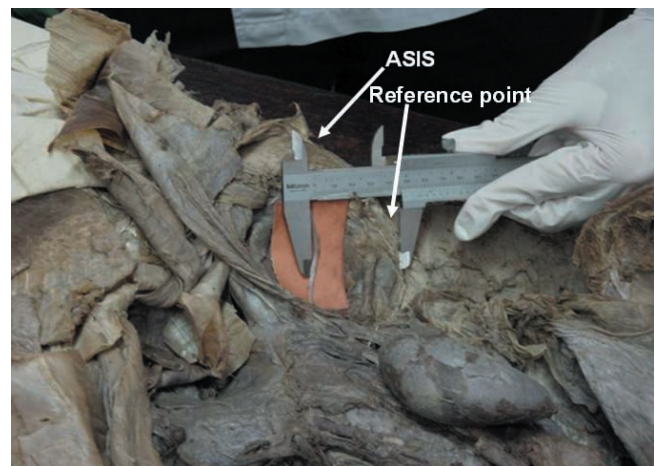


Fig. 2 The distance between the nerve and the referent point on the iliac crest (the point at 5 cm. above the ASIS which is in the area where Steinmann pin would be applied) was measured and recorded.

RESULTS

From dissecting 80 specimens of the LFCN, it was found that 51 nerves were of type C (64%) and 29 were of type D (36%). In 5 cadavers, different types of nerve were found in the same cadaver. One cadaver (2.5%) was found to have the communication of the LFCN which ran across the iliac crest joining the ilioinguinal nerve on both sides of the legs. No cadaver had its nerve exit the ilium above the ASIS.

The mean distance between the nerve and the ASIS was 0.51 cm. below the ASIS, and the mean distance between the referent point and the nerve was 4.52 cm. (Table 1)

Table 1 Data of 40 cadavers, distance from LFCN to ASIS and distance from LFCN to reference point

	Age (years)	Height (cm)	Distance between ASIS (cm)	Distance from LFCN to ASIS (cm)	Distance of LFCN from reference point (cm)
Min	39	140	21.5	0	2.5
Max	88	176	26.5	2.5	7
Mean	68.83	160.03	23.61	0.51	4.52
Median	70	161.5	23.5	0	4.5
Mode	71	166	23	0	5

ASIS = anterior superior iliac spine

LFCN = lateral femoral cutaneous nerve

DISCUSSION

This study demonstrates that the LFCN arises from the posterior division of L2 and L3 root which joins together and runs diagonally to the ASIS. Sixty-four percent of the nerve runs above the ASIS and 36 percent runs beneath the ASIS. Our findings show the area most vulnerable to injury or compression to the nerve which may be caused by Steinmann pin fixation or tight-fitting brace around this area. The condition meralgia paresthetica which defines the injury to this nerve can be confirmed by injection of anesthetic agents around this area. Our study shows that the injection should be at the ASIS and should not be more than 2.5 cm. below the ASIS otherwise no nerve will be encountered. Since the nerve runs medial to the reference point at the mean distance of 4.52 cm, the depth of the spikes of the external fixator aiming guide should not be this deep. Otherwise they will injure the nerve. Several studies have demonstrated injury to the nerve in harvesting bone graft from iliac crest^{5,6}. As the nerve does not exit the pelvis above the ASIS, we are quite sure that iliac bone graft harvesting will not injure the nerve, except if the digging is deeper down to get more bone graft.

The article by Yasuaki Murata¹ shows some types of nerve that have not been found in this study, i.e. type A and type B. Nevertheless, we have to be aware of these types of nerve when an operation is performed around this area, and the patient should be informed about the chance of injury to the nerve as referred to in his article.

REFERENCES

1. Yasuaki M, Kazuhisa T, Masatsune Y, Yutaka S. The anatomy of the lateral femoral cutaneous nerve with special reference to the harvesting of iliac bone graft. JBJS 1997; 82 A: 746-7.
2. Aporn C, Sanjai S, Siriporn T, Rungsan S, Nutchaya A. Anatomical variation of the lateral femoral cutaneous nerve as it exits the pelvis in Thais from the central region. Siriraj medical document 2003; 55-3:152-7.
3. Massey EW. Meralgia paresthetica secondary to trauma of bone graft. J Trauma 1980; 20: 342-3
4. Warfield CA. Meralgia paresthetica. Cause and cures. Hosp Prac Off Ed 1986; 21: 40A, 40C, 40I.
5. Mirovsky T, Neuwirth M. Injuries to the lateral femoral cutaneous nerve during spine surgery. Spine 2000; 25: 1266-9.
6. Kurz LT, Garfin SR, Booth RE. Harvesting autogenous iliac bone grafts. Spine 1989; 14: 1324-31.