Anatomical variation of femoral nerve location in relation to femoral artery - An ultrasonographic evaluation

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Introduction:

The femoral nerve block is ideal for surgeries of the femur, knee, or anterior thigh and is often combined with a sciatic nerve block for near complete lower extremity analgesia. The classic teaching is that the femoral nerve lies lateral to femoral artery sandwiched between the fascia iliaca and iliopsoas muscle[1].

Aim:

The objective of the study is to find out the anatomical variation in the site of the femoral nerve in relation to the femoral artery, with respect to the age, sex, and BMI of the patient.

Anatomy:

The femoral nerve is the largest branch of lumbar plexus originating from ventral rami of 2nd, 3rd and 4th lumbar nerves. The nerve descends through the psoas muscle emerging from psoas at lower part of the lateral border. It passes underneath the inguinal ligament lying in the concave groove between iliacus and psoas muscle under fascia iliaca [2]. At the inguinal crease, it lies 0.5-1 cm lateral to the femoral artery [1,3,4]. It divides into anterior and posterior divisions and supplies iliacus, pectineus and muscles of anterior compartment of thigh except tensor fascia lata, and cutaneous innervation to the anterior and medial part of thigh and medial side of the leg. It also supplies articular branches to hip and knee joint.

Sonoanatomy:

The femoral nerve is scanned with high frequency linear probe because of its superficial nature. Distal to the inguinal ligament, it lies lateral to femoral artery deep to fascia iliaca. The artery can be easily identified because of its pulsation and if there is difficulty Doppler can be used. The femoral nerve can be seen as a triangular hyperechoic shadow lateral to the artery[2]. Routinely, distal to the inguinal crease, when the femoral artery bifurcates into the superficial femoral artery and profunda femoris artery, the femoral nerve too divides into an anterior and posterior division. Occasionally, the bifurcation of the artery occurs early, even as high as the inguinal crease [5,6.]

Methodology:

200 patients above the age of 18 coming for fixation of fracture femur, will be enrolled in the study after explanation of the details. They will be divided into two groups according to age.

Group 1 - age between 18 and 60 and Group 2 - age above 60.

Those persons below the age group of 18, patients with any neurological illness that hinders them from giving a valid consent and those with local pathology at the inguinal region will be excluded. Those scans in which measurement is not possible secondary to poor image quality is excluded after enrolment. Those patients in which there is abnormal anatomy of femoral nerve or artery like early division (above the inguinal ligament) also not included in the study.

After explaining the scanning procedure in detail and after ensuring the privacy, inguinal region will be exposed. Scanning will be done by same anaesthesiologist in all the patients. High frequency linear probe of frequency 5-16 Hz of Sonosite X-porte (Fujifilm Sonosite, Inc. Bothell, Wa98021 USA) will be used for scanning and saving image.

The probe is placed on the inguinal crease with pointer facing laterally and the femoral artery is identified by its pulsation. The nerve is identified as a hyper echoic triangular shadow lateral to the femoral artery. If the nerve is not visualised clearly, the probe is adjusted by tilting to get a clear image of the femoral nerve. Once a clear image is obtained, the image will be saved per the patient enrolment number.

A vertical line is drawn from the medial end of the femoral nerve. Another horizontal line is drawn from the 9o'clock position of femoral artery perpendicular to the first line. The distance between the points where the two lines meet and the 9o'clock position of the femoral artery is measured. (fig1)

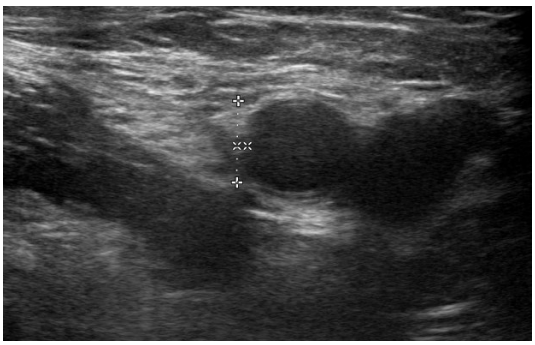

Fig 1 : measuring horizontal distance

If the femoral artery is branching at the level of inguinal crease, the scanning is done proximally to find out the point where the artery is single. The measurement will be taken at this point.

In addition, the data will be analyzed with respect to the sex, and BMI of the patient to know whether these variables influence the position of the femoral nerve in relation to the femoral artery.

Statistical method:

Pearson Correlation was used to find the correlation between age, BMI and distance between femoral artery & nerve. Independent t-test was used to compare the distance value by age group and gender.

References:

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