

Case of High Origin of the Common Peroneal Nerve Accompanied by Variation in the Sacral Plexus and the Piriformis Muscle

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During routine tutorial in gross anatomy, we encountered a case (female, older than 60 years) of altered gross anatomy of the sacral plexus and the piriformis muscle, and altered passage and distribution of the superior and inferior gluteal arteries and their branches. From the lumbosacral trunk and the ventral division of S_2 arise branches, which form a second plate. This plate is situated behind the sacral plexus and passes through the piriformis muscle dividing it into two separate parts. It separates the superior gluteal nerve and the common peroneal nerve. The latter leave the pelvis between the two parts of the piriformis muscle. The anterior plate of the sacral plexus divides into the inferior gluteal nerve, the pudendal nerve and the tibial nerve. The posterior cutaneous femoral nerve begins with two roots arising from the two plates of the sacral plexus. The superior gluteal artery has large diameter and its descending branch takes over the blood supply of the gluteus maximus muscle. The inferior gluteal artery and the obturator artery arise from a common trunk originating from the posterior branch of the internal iliac artery. The inferior gluteal artery leaves the pelvis through the infrapiriform opening. It passes behind the tendon of the internal obturator muscle and splits into several branches providing blood supply for the latter muscle, the gemmelli muscles and partially for the head of the femur and the capsule of the hip joint.

Key words: high origin of the common peroneal nerve, piriformis muscle variation, sacral plexus variation, piriformis entrapment syndrome.

The gluteal region is subject to a vast number of serious surgical interventions. Any unexpected variation in its anatomical organization and in the spatial relationship between its main blood vessels and nerves can obstruct the work of the inexperienced surgeon. Even more, some of the anatomical variations in the gluteal region and the pelvis could be manifested clinically through peripheral entrapment syndromes like sciatica syndrome of unknown origin, piriformis entrapment syndrome etc.

Material and Methods

During a routine tutorial in regional anatomy of the lower limb we discovered a case (female, older than 60 years) of complex variation, which includes altered gross anatomy of the sacral plexus and the piriformis muscle, and altered passage and distribution of the superior and inferior gluteal arteries and some of their branches.

Results and Discussion

Normally the sacral plexus represents a triangular plate that is formed by the lumbosacral trunk, the anterior division of the S1, and portions of the anterior divisions of S2 and S3 nerves and is placed in front of the piriformis muscle pointing with its apex towards the infrapiriform foramen. The superior gluteal artery passes between the lumbosacral trunk and the anterior division of S2, and the inferior gluteal artery passes between the ventral divisions of S2 and S3. The apex of the plate points towards the infrapiriform foramen, where it continues into the sciatic nerve. The latter passes into the gluteal region between the piriformis muscle and the gemellus superior muscle and laterally to the inferior gluteal nerve and artery [10].

In our case from the lumbosacral trunk and the ventral division of S2 begin branches, which form a second plate. This plate is located behind the sacral plexus and passes through the piriformis muscle dividing it in two parts. It separates the inferior gluteal nerve and the common peroneal nerve (Fig. 1). The latter leave the pelvis between the two parts of the piriformis muscle. The anterior plate of the sac-

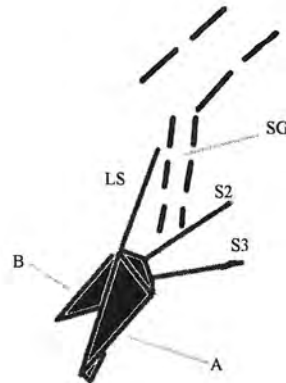


Fig. 1. Pelvic cavity. Sacral plexus

A — anterior plate; B — posterior plate; LS — lumbosacral trunk; SG — superior gluteal artery

ral plexus divides into the pudendal nerve and the tibial nerve. The posterior cutaneous femoral nerve begins from both plates of the sacral plexus with two roots forming a loop, which covers posteriorly the inferior part of the piriformis muscle. The superior and the inferior gluteal artery begin with a common trunk which exits the



Fig. 2. Posterior view of the piriformis muscle
GM — gluteus maximus muscle; PM — piriformis muscle; CP — common peroneal nerve;
TN — tibial nerve; IGA — inferior gluteal artery (superficial branch of the superior gluteal
artery); IGN — inferior gluteal nerve; CFP — posterior cutaneous femoral nerve

pelvis through the suprapiriform foramen and divides in the two gluteal arteries outside the pelvis so, that the inferior gluteal artery resembles in position and direction the superficial branch of the normal superior gluteal artery. In the described case this branch is very large in diameter and anastomoses with the lateral circumflex femoral artery (Fig. 2). Through the infrapiriform opening passes a small artery beginning in a common trunk with the obturator artery. In the gluteal region it passes behind the gemellus superior and the tendon of the obturator internus muscle and splits into several branches providing blood supply for the surroundings.

In the literature there is no information about the incidence of similar complex variation. The incidence of some of the described anomalies is as follows:

- superior and inferior gluteal artery rising in common trunk that divides outside the pelvis - about 3,5% (B r a i t h w a i t e, 1952) [2];
- high origin of the peroneal nerve passing through a divided piriformis muscle — about 14.3% (P o k o r n y et al. 2006) [9].

However, similar complex variations in the gluteal region are described often [3, 5, 7]. The variations of the branches of the sacral plexus and the muscles of the gluteal region are widely discussed in the literature mostly in connection to the diagnosis and treatment of the peripheral entrapment syndromes [1, 4, 6, 8]. Unfortunately, in our case there is no data whether the patient has expressed symptoms of entrapment of the common peroneal nerve and/or the inferior gluteal nerve. However, considering the literature it is very likely.

Another aspect of the described variation is the modification of the arterial bed of the inferior and superior gluteal artery, which leads to altered collateral network around the hip joint. Since the hip joint is subject to elevated surgical interest, the possibilities for such alteration must be taken into consideration prior to a surgical intervention in the gluteal region.

The structure of human body, although based upon common principles, differs from one individual to another. Thus inside the human population exist multiple variants of the human anatomical structure. The most common variant is known as “normal anatomy”. The variants, distinctly deviating from this “normal” variant, are labelled “anatomical variation”. In fact if one summarizes the incidence of all anatomical variations, one will realize that anatomical variations are occurring in the human population at least as often as the normal anatomical variant. That is why the healthcare provider must be familiar to the “normal” anatomy and to the anatomical variations as well.

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