

TOPOGRAPHIC VARIATIONS OF SCIATIC NERVE IN RELATION TO PIRIFORMIS

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ABSTRACT

BACKGROUND

The aim of this study was to evaluate the anatomical relationship between piriformis muscle and sciatic nerve. Sciatic nerve is thickest nerve commonly dividing into tibial nerve and common fibular nerve. It is derived from lumbosacral plexus L4 to S3 spinal nerves. Aim of the present study is to find out the relations of sciatic nerve and its relation to piriformis muscle.

MATERIALS AND METHODS

60 gluteal regions and posterior compartment of thigh were studied from 30 formalin fixed cadavers kept for dissection, out of which 27 were male cadavers and 3 were female cadavers.

RESULTS

Normal course of sciatic nerve was studied in 50 limbs, out of which 10 limbs had variations in division in relation to piriformis muscle.

CONCLUSION

Knowledge of variations of sciatic nerve in relation to piriformis is useful in anaesthetic procedures, hip arthrodesis and treating sciatic nerve compression.

KEYWORDS

Hip Arthrodesis, Piriformis, Sciatic Nerve, Sciatic Nerve Compression.

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BACKGROUND

Sciatic nerve is two cm wide at its origin and this is the thickest nerve in the body. It leaves pelvis via greater sciatic foramen below piriformis descends between greater sciatic foramen and ischealtuberositities.¹ Sciatic nerve also called ischiadicus or Ischiatic² nerve or Ischiaditic nerve. It is derived sciatic nerve usually derived from L₄ – S₃. It contains fibres of anterior and posterior division. Sciatic nerve usually terminates into two branches above popliteal region forming into common fibular nerve and tibial nerve.

Tibial division innervates hamstring muscles of posterior compartment of thigh, muscles of posterior compartment of leg and foot. Common fibular division innervates short head of biceps femoris, muscles of lateral and anterior compartment of leg, dorsum of foot, as for sensory portion innervations of leg and foot are provided.³

Piriformis is key muscle of gluteal region. It originates from anterior surface of 2nd to 4th sacral segment from upper margin of greater sciatic notch of sacrotuberous ligament.

Variations of exit of sciatic nerve in relationship to piriformis muscle which may exist between sciatic nerve and piriformis muscle. Usually nerve emerges from pelvis passing beneath piriformis muscle. Muscle may split into two heads. The nerve may divide in pelvis into tibial and common fibular portions. Four combination of sciatic nerve variation in relation to piriformis recorded (Figure 1).⁴

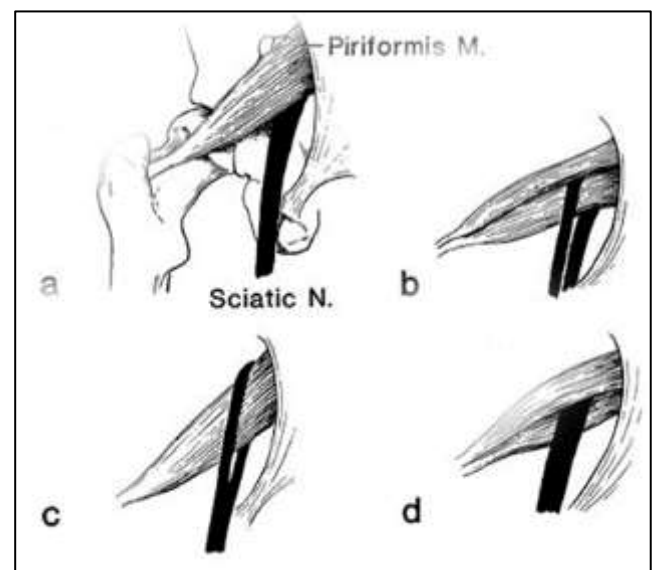


Figure 1. Variations of Sciatic Nerve to M. Piriformis

Variations of exit of sciatic nerve in relation to piriformis muscle may lead to nerve compression.

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Knowledge about the sciatic nerve variations are used in day to day medical practice and also in neurology, orthopaedics, rehabilitation and anaesthesia related cases. Higher division of sciatic nerve may lead to incomplete block of sciatic nerve during popliteal block.⁵

Aim

Aim of our study is to observe the sciatic nerve variations in 60 gluteal regions.

MATERIALS AND METHODS

In Government Medical College, Guntur 60 gluteal regions were examined in 30 formalin fixed cadavers kept for routine dissection out of which three were female and twenty-seven were male. Following the proper exposure, the location of sciatic nerve and its exit from pelvis and level of sciatic nerve division in relation to piriformis were recorded. Sciatic nerve bifurcates at superior angle of popliteal fossa.

RESULTS

Variations in sciatic nerve bifurcation were seen ten male cadavers-

- 1) Higher division of Sciatic nerve passes through piriformis in one cadaver right limb-1 case (Figure 2).
- 2) Sciatic nerve higher division in pelvis common fibular nerve above piriformis in left limb – 2 cases (Figure 3).
- 3) Sciatic nerve higher division common fibular nerve piercing piriformis tibial nerve below piriformis right limb – 2 cases (Figure 4).
- 4) Higher division of sciatic nerve below piriformis right limb – 3 cases (Figure 5).
- 5) Higher division of sciatic nerve left limb -2 cases (Figure 6).

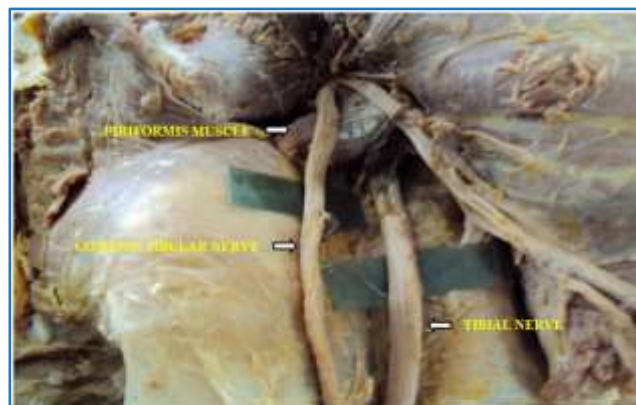


Figure 3. Sciatic Nerve Higher Division in Pelvis, Common Fibular Nerve above Piriformis in Left Limb - 2 Cases



Figure 4. Sciatic Nerve Higher Division Common Fibular Nerve Piercing Piriformis, Tibial Nerve Below Piriformis Right Limb - 2 Cases

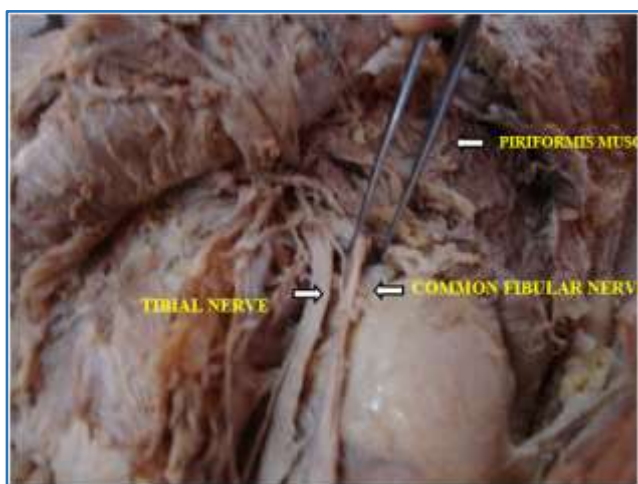


Figure 2. Higher Division of Sciatic Nerve Passing Through Piriformis in Right Limb - 1 Case

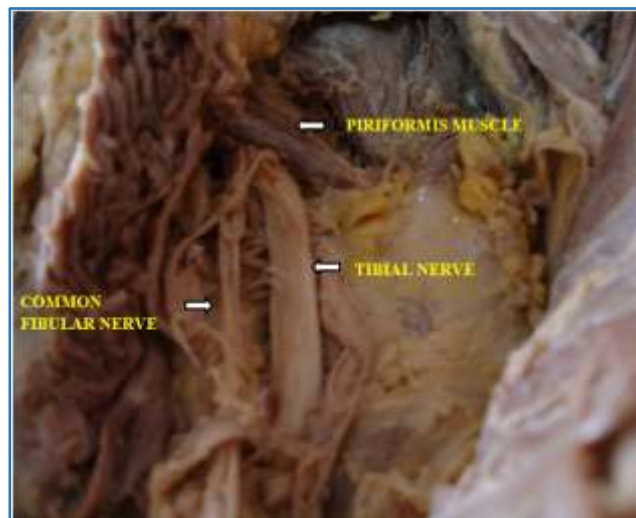


Figure 5. Higher Division of Sciatic Nerve below Piriformis Right Limb - 3 Cases



Figure 6. Higher Division of Sciatic Nerve below Piriformis Muscle- Left Limb- 2 Cases

Sl. No.	Variations	No. of Variations	%
1.	Sciatic nerve passes below piriformis	50	83.3%
2.	Higher division of sciatic nerve passing through piriformis in Right limb	1	1.8%
3.	Sciatic nerve higher division common fibular nerve above piriformis in Left limb	2	3.3%
4.	Sciatic nerve higher division common fibular nerve passes through piriformis in Right limb	2	3.3%
5.	Higher division of sciatic nerve below piriformis in Right limb	3	5%
6.	Higher division of sciatic nerve below piriformis in Left limb	2	3.3%

Table 1

DISCUSSION

Normally sciatic nerve passes out through greater sciatic foramen below piriformis. It divides into tibial and common fibular nerve at superior angle of popliteal fossa (80-90%). Present study showed normal division of sciatic nerve in 50 limbs out of 60. In two cases higher division of sciatic nerve below piriformis in left limb. In three cases higher division of sciatic nerve in right limb. In one case sciatic nerve higher division piercing piriformis in right limb. (Table-1)

The percentage of variation noted was normal course of sciatic nerve is 83.3%, higher division of sciatic nerve passes

through piriformis is 3.3% in right lower limb, higher division of sciatic nerve common fibular nerve above piriformis is 3.3%, higher division of sciatic nerve passing through piriformis is 1.8%, higher division of sciatic nerve below piriformis left lower limb.

Bregman described 4 types of variations in relation to piriformis.⁴

- Type A: Sciatic nerve passes below piriformis.
- Type B: Higher division common fibular nerve passes between 2 heads of piriformis.
- Type C: Higher division common fibular nerve passes above piriformis.
- Type D: Sciatic nerve passes in between piriformis muscle.

In our study we got Type-B & Type-C variations. Beaton & Anderson et al.⁶ have described the relation of sciatic nerve & piriformis muscle into 6 types-

- Type 1: Undivided nerve below undivided muscle.
- Type 2: Division of nerve below undivided muscle.
- Type 3: Division of nerve below and above undivided muscle.
- Type 4: Undivided nerve between heads of piriformis.
- Type 5: Division between and above heads.
- Type 6: Undivided nerve above undivided muscle.

Topographic variations of sciatic nerve and its relation to piriformis muscle studied by Pocorny et al.⁷ Atypical relationship found in 19 cadavers out of 190 cadavers (20%), unsplit nerve through piriformis 2.2% and anatomic variations of sciatic nerve and piriformis 15-30%.

Urgenovic et al. studied Level of sciatic nerve division. According to him out of 200 limbs sciatic nerve left pelvis below piriform foramen out of them he noticed 8 lower limbs have variable relations between sciatic nerve and piriformis observed common fibular nerve piercing piriformis muscle. Common fibular nerve above piriformis in 1.5% limbs.⁸

In our study higher division of sciatic nerve common fibular nerve passes through piriformis in 3.3% of cases. In 3.3% cases common fibular nerve above piriformis (Table-2).

Sarita et al studied 25 cadavers of 50 lower limbs. 52% sciatic nerve exited as whole nerve 48% higher division has occurred.⁹

In our study no variations in 83.3% and variations are seen in 16.7% (Table-2).

Name of Author	No. Variation	Common Fibular Nerve Piercing Piriformis	Undivided Nerve Passing Through Piriformis	Higher Division Commonly Passing Below Piriformis	Higher Division below Piriformis	Higher Division of Sciatic Nerve Passing through Piriformis
Urgenovic et al ⁶	96%	2.5%	-	1.5%	-	-
Sarita et al ⁷	52%	24%	-	24%	-	-
Pocorny et al ⁸	79.1%	14.3%	2.2%	-	-	-
Present Study	83.3%	3.3%	-	3.3%	8.3% (5% in Right Limb, 3.3% in Left Limb)	1.8%

Table 2

CONCLUSION

Knowledge of variations of sciatic nerve in relation to piriformis is useful in surgeries like hip arthrodesis, anaesthetic procedures like popliteal block and treating sciatica.

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