

A triplicate obturator foramen

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The obturator foramen is a large opening in the hip bone situated below and anterior to the acetabulum. The obturator foramen is enclosed by the obturator membrane, apart from the part above near the obturator groove, where the obturator vessels and nerve pass through. The present study reports multiple openings in the obturator foramen detected incidentally in a left hip bone specimen and discusses its clinical implications. To the best of our knowledge, the occurrence of multiple openings associated with the obturator foramen is rare and has not been reported in any standard textbook of anatomy or in any research study. Anatomical knowledge of the presence of such anomalies may be clinically important for radiologists interpreting skiagrams and surgeons performing operative procedures in the hip region.

Key words: triplicate, obturator, foramen, canal, bone, anomaly, variation

INTRODUCTION

The obturator foramen is a large opening in the hip bone, which is bridged by the obturator membrane, except for above, where there is a communication between the pelvis and the thigh. This communication, also known as the obturator canal, is the passage through which the obturator vessels and nerves pass [4]. An extensive review of the literature revealed a single case with duplication of the obturator foramen in a radiological study [2]. However, there are no osteological studies on the morphology of the obturator foramen and associated openings.

The paucity of literature on the anomalies of the obturator foramen has made this study more interesting from an academic and a clinical point of view. The obturator region has mainly been used by surgeons for sling operations and as a route for cystocele repair. Prior knowledge of the anatomy of the obturator region and its structures would ensure safe surgery in the region. The presence of multiple

openings associated with the obturator foramen may also lead to erroneous interpretation of skiagrams. Sling operations may be difficult in cases of anomalies involving the obturator region.

CASE REPORT

During routine osteology teaching of undergraduate medical students, we detected an anomalous obturator foramen in a left hip bone. Its anatomical features were studied in detail by examination of the lateral and pelvic surfaces and appropriate morphometric measurements were taken. The bone specimen was photographed and its skiagram was also obtained for study of the radiological features (Fig. 1–3).

OBSERVATIONS

Obturator foramen

Lateral surface (Fig. 1). The obturator foramen was oval in shape (Fig. 1 "c") and also displayed two small accessory openings within its boundary. The



Figure 1. Photograph of the left hip bone (lateral surface) showing: a — upper opening in the obturator foramen; b — lower opening in the obturator foramen; c — obturator foramen; d — acetabulum; e — ischial tuberosity.

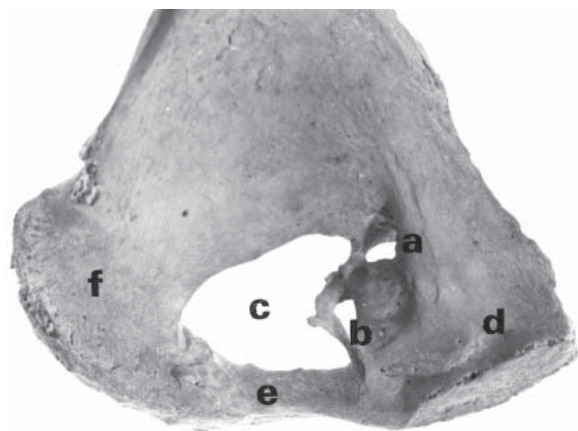


Figure 2. Photograph of the pelvic surface of the left hip bone showing: a — upper opening; b — lower opening; c — obturator foramen; d — pubis; e — ischiopubic rami; f — ischium.

obturator canal was closed by a plate of bone inferiorly to form a complete opening (the first opening). The plate of bone surrounding the obturator canal

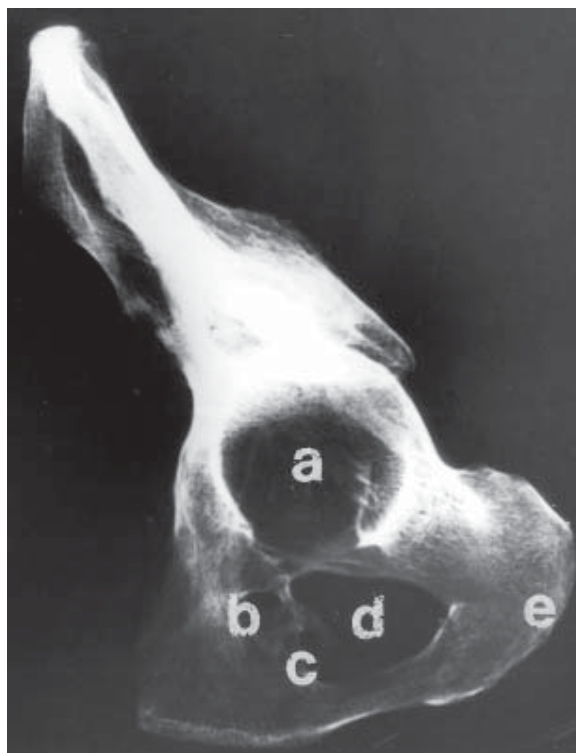


Figure 3. Skiagram of the left hip bone (lateral view) showing: a — acetabulum; b — upper opening; c — lower opening; d — obturator foramen; e — ischial tuberosity.

could be traced to the inferior pubic ramus to form another opening (the second opening). A communication existed between the first and second openings. The two openings (Fig. 1 "a", "b") were thus located within the boundaries of the main obturator foramen. The plate of bone surrounding these two openings was clearly visible in the skiagram.

The maximum transverse and vertical dimensions of the upper opening measured 1 cm and 1.1 cm respectively. The lower opening measured 1.7 cm 1.8 cm in its maximum transverse and vertical dimensions respectively.

Pelvic surface (Fig. 2). The two openings associated with the obturator foramen were clearly visible. The upper opening (Fig. 2 "a"), the obturator canal, was covered by a plate of bone on its posterior aspect. Thus the obturator canal (Fig. 2 "c") in the present case was found to be closed by a plate of bone, which is an unusual feature. The two openings (Figs. 2 "a", "b") were located within the limits of the obturator foramen.

DISCUSSION

With regard to the anatomical position of the pelvis (inclined), the obturator foramen is bounded

anterosuperiorly by the superior pubic ramus, posteroinferiorly by the ischial ramus, laterally by the ischial body and medially by the pubic body and its inferior ramus. The foramen is covered by the obturator membrane, which is attached to its margins except above, where a communication exists between the pelvis and the thigh [4]. This communication is the obturator canal, through which the obturator nerves and vessels pass out of the pelvis. The obturator foramen is large and oval in males but small and triangular in females [4]. The obturator foramen seen in the present case was oval in shape and other osteological features, such as everted ischiopubic rami, also confirmed that the specimen belonged to the male sex.

An earlier research study had reported a unilateral double ischium [5]. On extensive review of the literature we found only a single case of a double obturator foramen, which had been detected in X-ray film [2]. The present study reports a case of two small accessory foramina in addition to the usual obturator foramen. It could be designated as a case of triplicate obturator foramen, an extremely rare entity.

The presence of a plate of bone in the obturator foramen may also lead to compression of the nerves and blood vessels with neurological and vascular effects.

The literature on the morphology of the obturator foramen and associated openings is scanty. The obturator foramen has been studied in detail to find out the potential risks to the dorsal nerve of the penis and the obturator canal when different slings are used [1]. Researchers have also studied the obturator region to analyse the relationships of the trans-obturator sling and anatomical structures within the obturator region [6]. The obturator region has also been used for cystocele repair by a synthetic vaginal mesh, which is secured anteriorly through the obturator foramen [7]. This region has also been used for the management of short pedicled undescended testicle [3]. Pelvic osteotomy

also requires prior anatomical knowledge of the obturator region. In the light of the above facts, the importance of the obturator foramen cannot be overlooked in clinical practice.

The presence of multiple openings associated with the obturator foramen may also influence the action of the obturator externus and the obturator internus muscles by altering the biomechanics. There may be distortion in the contour of the obturator fascia, which is normally attached to this region. A double obturator foramen was reported earlier in a radiological study alone [2]. The present study is unique of its kind, since it reports an unusual morphology of the obturator foramen, namely a triplicate obturator foramen revealed in the bone specimen as well in the skiagram. Anatomical knowledge and awareness of variations in the foramina associated with the obturator foramen may be of immense clinical importance to surgeons and radiologists.

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