CLINICAL REPORT

Sciatic nerve compression related to ossification of the sacrospinous ligament secondary to pelvic balance abnormalities

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Summary The authors report an isolated case of right sacrospinous ligament ossification causing sciatic pain because of compression of the proximal sciatic nerve. The initial conservative treatment of injections in the conflict zone and the intervertebral joints was insufficient. Surgical exploration was undertaken via a posterior approach, demonstrating the conflict between the nerve and the ossified ligament. Resection of the ossified ligament eliminated the symptoms at the cost of transitory buttock hypesthesia. The anatomic and pathologic exam identified simple osseous metaplasia. Lumbar-pelvic coxometry analysis showed sagittalization of the acetabular roofs, excessive bilateral femoral torsion, and a step-off attenuation at the anterior cervicocephalic junction (low anterior cervico-cephalic femoral offset). In addition, reduced lumbar lordosis and accentuated sacral slope were noted, factors that could be related to modifications in the static balance of the lumbar-pelvic complex. This imbalance could be correlated to an increase in the forces applied to the pelvic ligament layers. The etiological hypothesis retained was that this osseous metaplasia was a reaction to excessive stresses on the sacrospinous ligament.

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Introduction

The etiological diagnosis of buttock pain is difficult because such pain can correspond to projected lumbar radicular pain or spinal nerve compression or even more rarely to coxal pain [1–4]. Of the sources of pain related to nerve compression, the nerve roots are usually involved and exceptionally the nerve trunk [4]. We report the case of buttock pain related to high compression of the sciatic nerve caused by ossification of the sacrospinous ligament. Although ossifications in the hip region have already been observed in sciatic nerve compression, their etiological diagnosis most often remains imprecise, and, to our knowledge, this type of ossification has never been seen with malorientation of

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the lumbar-pelvic complex [5,6]. This clinical observation presents a diagnostic procedure for selecting hypotheses, illustrated by a rare cause, and contributes information that can be useful in the reflection on the lumbar-pelvic complex’s orientation.

Observation

A 37-year-old female patient, a nurse’s aide with no medical history, who did not participate in any sports activities, was examined for mechanical positional pain of the buttock and lower limb on the right, mainly when sitting, which increased with exercise (notably climbing and descending stairs). The patient described severe, daily, and invalidating right truncated sciatic pain (starting point in the buttock, posterior pain in the thigh limited to the popliteal zone). Clinically, there was pain upon direct palpation of the ischial spine. At examination, a Tinel sign in the buttock was found upon percussion. In the supine position, the pain was reproduced when flexing the thigh on the pelvis. The patient therefore had symptoms suggesting a subpiriform canal syndrome.

The radiographic examination (Figs. 1 and 2) showed right pelvic ossification along the sacrospinous ligament trajectory as well as bilateral coxarthrosis predominantly on the right, a slight acetabular protrusion, and caput retrorsa. Analysis of the pelvic antero-posterior (AP) image showed effacement of the anterior wall of the acetabulum, suggesting acetabular retroversion. No major abnormality was noted on the lumbosacral spine. Since there was no motor deficit, an electrophysiological exam was not warranted for diagnosis or prognosis.

Computed tomography (CT) allowed us to characterize this ossification and precisely measure the patient’s acetabular anteversion and antetorsion of the femoral necks (Figs. 3 and 4). On the X-rays and CT scans, coxarthrosis promoted by the accentuation of the acetabular anteversion, sagittalization of the acetabular roofs, and the excess femoral antetorsion was observed. The pelvic coxometry measurements found: (1) acetabular anteversion (corrected in the upright position) at 33° on both the right and left; (2) an anterior hollow at the femoral head-neck junction due to more posterior development of the femoral head compared to the theoretical axis of the neck (low anterior femoral offset): alpha right 51° and left 64°; (3) sagittalization of the acetabular roofs at 16° on the right and 10° on the left; (4) femoral diaphyseal torsion at 23° on the right and 28° on the left. These measurements demonstrated a posterior localization of the femoral head centers compared to the theoretical axis of the neck and the frontal plane, source of posteroinferior arthrosis.

The hypothesis of pain related to abnormal solicitation of the lumbosacral hinge was suggested based on the observation of sagittal balance abnormalities in the lumbar-pelvic complex [7,8]. The images showed, seated and upright: (1) a pelvic incidence at 68°, a sacral-acetabular angle at 100°;
Sciatic nerve compression related to ossification of the sacrospinous ligament

The patient returned to work 3 months after surgery.

Walking was resumed after 2 weeks and in the buttock attributable to lesions of sensitive branches of the sciatic nerve with resection of the sacrospinous ligament under general anesthesia was performed, in the ventral decubitus position, via a Kocher-Langenbeck approach to reach the ischial spine. Dissection up to the sciatic nerve demonstrated a conflict between the sciatic nerve and the ossified portion of the sacrospinous ligament. The anatomic and pathologic exam revealed that the problem stemmed from simple osseous metaplasia.

The failure of the infiltrations at the vertebral articulations of the lumbosacral hinge, L5–S1, guided by the image intensifier, eliminated the possibility of intricated pain originating in the lower spine. Surgical neurolysis of the sciatic nerve with resection of the sacrospinous ligament under general anesthesia was performed, in the ventral decubitus position, via a Kocher-Langenbeck approach to reach the ischial spine. Dissection up to the sciatic nerve demonstrated a conflict between the sciatic nerve and the ossified portion of the sacrospinous ligament. The anatomic and pathologic exam revealed that the problem stemmed from simple osseous metaplasia.

Uneventful postoperative recuperation allowed the patient to return home early, on the second day. During consultations at 2 weeks and 3 months, we observed the complete disappearance of the symptoms reported by the patient, at the cost of a small transitory zone of insensitivity in the buttock attributable to lesions of sensitive branches of the gluteal nerve. Walking was resumed after 2 weeks and the patient returned to work 3 months after surgery.

Discussion

The case presented herein is rare because it results from a syndrome of the subpiriform canal. The sacrospinous ligament more frequently compresses the pudendal nerve than the sciatic nerve [9–13]. Moreover, ligament ossifications are rarely the source of a subpiriform canal syndrome. Many extrinsic causes of sciatic nerve compression have been reported in the literature: tumors, muscles (hamstrings, etc.), tendons, abscess, hematomas, endometriosis [5,6,14,15]. However, the most frequent cause is the piriform syndrome [16,17]. This pelvitrochanteric muscle plays an important role in the anteroposterior adjustment of the pelvis. In this syndrome, similar symptoms to those found in the present case are described, with uni- or bilateral pain, located in the buttocks or projecting from the buttock, irradiating in the lower limb following a pseudoradicular trajectory, always incomplete, with all these signs observed with a normal exam of the lumbar spine. On examination, the clinical signs are reproduced during internal rotation and limb adduction against resistance [18].

However, compressive ossifications of the sciatic nerve trunk are few in number. The literature presents: (1) posttraumatic lesions after a complex fracture of the pelvis resulting in a conflict with malunion [19,20] after pelvic fracture-dislocation with comminution of the posterior wall of the acetabulum [17,21,22]; (2) iatrogenic lesions, after fixation of a pelvic fracture [18]; (3) more rarely after fracture of the great trochanter [23]; (4) the mechanical causes including one case of proximal ossification of the femoral biceps in a weightlifter [18]; and (5) idiopathic causes including one case of voluminous ossification with no etiology or promoting factor identified [24].

The narrow anatomic ratios between the inferior gluteal nerve and blood vessel structures, including the sciatic nerve and the sacrospinous ligament, are a potential factor of conflict, as shown by a cadaver study [25]. Triangular in shape, the sacrospinous ligament inserts on the medial edge of the sacrum, fourth and fifth vertebrae, and the coccyx, runs diagonally downward, outward, and forward, terminating at the top of the ischial spine. The sacrospinous ligament crosses the sciatic nerve at its distal two-thirds. Anatomic variations exist in the trajectory of the sciatic nerve and the piriform muscle. An intramuscular trajectory is described classically in 0.8%, with the medial part of the nerve (corresponding to the tibial nerve) passing above the piriform in 3.3% or through it in 11.7% [26,27]. The sciatic nerve can also be divided into two contingents, common fibular and tibial, with one of the contingents possibly crossing the piriform muscle belly, or even passing on either side [26]. Similarly, the trajectory of the piriform is subjected to variations, with some creating or aggravating a conflict with the sciatic nerve. In our observation, the documentation, notably the CT scan, allowed us to rule out an anatomic variation of the sciatic nerve in its pelvic portion [27].

This clinical case poses the diagnostic problem of intricated buttock pain between the lumbosacral hinge and the lower limb, possibly resulting from coxarthrosis, lumbosacral abnormalities, and muscular causes. The patient presented coxarthrosis related to morphological abnormalities of the cervicocephalic junction promoting posteroinferior arthrosis.

In the literature, a mean 12° with a standard deviation of 6° pelvic tilt and a mean 40° sacral slope (S.D., 15°) for the upright position [7]. A study on 100 healthy patients [8] analyzed the sacral sagittal angle measurement variations between the seated and upright positions: the sacral slope means were, respectively, 39.4° in the upright position and 18.7° in the seated position. Phillipot et al. [28] reported similar results in patients suffering from hip arthrosis by comparing the means of pelvic parameters in patients standing, sitting, or lying down. These numbers indicate an accentuation of the sacral slope in our patient.

Figure 4 3D Reconstruction from anterior CT slices isolating the bone structure.

(2) a sacral slope calculated at 53° in the upright position and 39° seated; (3) pelvic tilt at 15° upright and 29° seated. Moreover, we noted slight lumbar lordosis in this young patient: overall lumbar lordosis (50°), high lumbar lordosis (47°), and low lumbar lordosis (37°).

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The etiological diagnosis of ossification is more difficult, because there was no history of injury or surgery. One hypothesis would be that this osseous metaplasia was a physiological response of the sacrospinous ligament to an excess of stress, without, however, explaining the unilateral nature of the lesion. This observation provides a new angle from which to view the narrow ratios between the hip joint, the lumbosacral junction, and the lumbar spine.

Conclusion

Our observation provides an example of extrinsic compression of the sciatic nerve caused by ossification of the sacrospinous ligament. The detailed study of the diagnostic images showed abnormalities involving acetabulum version, femoral torsion, and problems with the sagittal balance of the lumbopelvic complex. This was a rare case of subpiriform canal syndrome related to sacrospinous ligament ossification, successfully treated with neurolysis of the sciatic nerve and excision of the ossified ligament.

Conflicts of interest

None.

References