Evaluation Of The Incidence And Etiological Distribution Of Extraspinal Non-Traumatic Sciatica Using Computed Tomography And/Or MR Imaging

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Sciatica is the most common symptom encountered in neurosurgery practices and can be seen among the 40% of adults in any period of time during their lifetime (3, 29). It has been described as the pain in hip and lower extremities effecting the sciatic nerve and its branches along the intraspinal and extraspinal extension developed after secondary pathologies (1, 9). The most significant cause of sciatica is a herniated lumbar disc putting pressure on nerve roots or spinal stenosis. Imaging of the lumbar vertebral column, along with revealing the causes of intraspinal non-discogenic sciatica; on account of the routine tests focusing on the lumber vertebra, frequently misdiagnoses the extraspinal sciatica (3).

Although numerous diseases affecting the sciatic nerve have been characterized in a considerably successful way, the incidences of there are not entirely known. Besides, according to our literature there is no certain, accurate information related with the etiological distribution of sciatica available.

The aim of this study is to present our patient series of twenty-seven patients with non-traumatic extraspinal sciatica and to investigate the frequency and the etiological distribution of extraspinal non-traumatic sciatica through the evaluation of magnetic resonance imaging (MRI) and/or computed tomography (CT) scan findings.
Methods and Materials

Among the 19,200 patients directed to a doctor of our hospital specialized in spinal diseases between the years February 2001 and November 2010, extraspinal sciatica or lumbosacral plexus diseases were identified in twenty-seven of those. The average ages of the twenty-seven patients were fifty-three (between eighteen and ninety-one). Thirteen of them were male, and the other fourteen was female.

CT scan and/or MR imaging findings and clinical information of twenty-seven patients with an unexplained sciatic pain distribution directed from a specialist orthopedist, a neurosurgery specialist and a neurologist were reviewed retrospectively.

In all of the twenty-seven patients, along with pain and paresthesia findings along the dermatomal distribution, there were definable motor defects in most of these patients. Patients with a history of trauma or whose imaging studies were not found to be suitable for evaluation were excluded from the study. All imaging studies were evaluated by a radiologist and one orthopedist and in the event of incongruity a consensus was reached. While establishing the final diagnosis, the clinical follow-up information that could have been obtained was also considered.

Examinations were performed using 1 Tesla MRI device (Signa, GE Medical System, Milwaukee, WI, USA) and 2 detector MDCT devices (Siemens Sensation 4, Siemens, Erlangen, Germany).
Results

The causes of non-traumatic extraspinal sciatica are summarized in table 1. In all of the patients, comprising nine among the twenty-seven cases (33.3%), sacroiliitis was found to be the most frequent cause of sciatica in our study. Tumors constituted the second most frequent cause with seven malign tumors (26%) and five benign tumors (18.5%) in the patients. Piriformis syndrome was the other common cause encountered (three patients, 11.1%). The remaining three causes (11.1%) were found to be presacral abscess, internal iliac artery aneurysm and arteriovenous malformation.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacroiliitis</td>
<td>9 (33.3)</td>
</tr>
<tr>
<td>Malignant tumors</td>
<td>7 (26)</td>
</tr>
<tr>
<td>Benign tumors</td>
<td>5 (18.5)</td>
</tr>
<tr>
<td>Piriformis syndromes</td>
<td>3 (11.1)</td>
</tr>
<tr>
<td>Other causes</td>
<td>3 (11.1)</td>
</tr>
<tr>
<td>Presacral Abscess</td>
<td>1</td>
</tr>
<tr>
<td>Aneurism of internal iliac artery</td>
<td>1</td>
</tr>
<tr>
<td>Arteriovenous malformation</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>27 (100)</td>
</tr>
</tbody>
</table>

Note.-Numbers in parentheses are percentages.

Table1: Frequency of Various Causes of Nontraumatic Extraspinal Sciatica

Causes of non-traumatic extraspinal sciatica

Sacroiliitis

Sacroiliitis, as one of the major causes of sciatica, must surely be considered for those particularly with rear femoral pain in the differential diagnosis of lumbar disc hernia (LDH) (2, 4). The characteristics of patient’s pain and history enable the determination of the diagnosis and etiology of sacroiliitis. The pain in sacroiliitis has an insidious onset, is commonly localized in the deep gluteal region and may refer to the posterior thigh. Pain decreases with activity, and increases during later in the night (2). Physical examination should include sacroiliac compression test, Gaenslen’s test and FABER test. Positive
FABER test may reflect the information regarding pathology. The early clinical diagnosis of sacroiliitis may be difficult; therefore it must be diagnosed radiologically. Both the MRI and the CT scan are sensitive methods in imaging sacroiliitis (2). In the sacroiliac MRI imaging for one of our patients, intra-articular edema which imposes pressure on the sciatic nerve in sacroiliitis and joint is apparent (Figure 1). In this patient symptoms were completely resolved after completion of the medical treatment.

Bone and soft tissue tumors

Extraspinal entrapment of the sciatic nerve is infrequent and difficult to diagnose because its symptoms are similar to more frequent causes of sciatica (i.e., herniated disc and spinal stenosis)(9). Extraspinal compression of the sciatic nerve associated with a tumor is a rare cause of sciatica (9). Tumor compression along the extent of the sciatic nerve have been defined in the literature in the form of case reporting (9, 10). The early diagnosis of underlying pathology is most significant. Because performing early resection, plays an important role on the survival of the patient by ensuring the recovery of the symptoms and at the same time preventing unnecessary spinal surgeries. We determined 12 patients with sciatica associated with the compression of bone and soft tissue tumors along the extraspinal extent of the sciatic nerve in our study. For example, in the MRI imaging belonging to one of our patients, a malign soft tissue tumor was discovered as the cause of extraspinal sciatica by applying pressure on the sciatic nerve (Figure 2).

Piriformis syndrome

Piriformis syndrome (PS) has been documented for more than 70 years and now is considered as a well known cause of sciatica (27, 30). The incidence of PS is between %6 to 8% in the patients with lower back pain (5, 20). Hypertrophy, inflammation, anatomic variations, myositis ossificans and traumatic injuries of the piriformis muscle could cause pressure on the sciatic nerve (6, 13). In most of the cases, this syndrome is associated with the hypertrophy of piriformis muscle due to recurrent injuries (24). Patients with piriformis syndrome, indicate very different symptoms such as buttock pain, sensitivity over the greater sciatic notch and increasing the pain with movements that increase piriformis muscle tension compared to those patients with discogenic sciatica (7, 30). In PS patients, unlike lumbar disc hernia, symptoms do not only consist of lateral (S1 radiculopathy) or medial (L5 radiculopathy) dermatomes, there is multiple dermatome involvement (2). FAIR (flexion, adduction and inner rotation of the hip) test assists the diagnosis of piriformis syndrome by performing pressure on the sciatic nerve (19). Straight leg raise test (SLR), is negative in piriformis syndrome unlike the lumbar disc hernia. Special tests such as Pace’s sign, Freiberg’s sign and deep palpation of the piriformis muscle are required during the differential diagnosis of the piriformis syndrome. If one of these tests turns out positive, further tests such as MRI or CT scan can be performed. In the MRI imaging belonging to one PS patient, piriformis asymmetry, bone marrow edema
in the connecting area of hamstring muscle and high signal increase on the piriformis muscle level is apparent (Figure 3). Physiotherapy protocol was performed to the patients for PS (8). Antalgic walking was arranged after physiotherapy ended. Freiberg's sign and FAIR test turned negative.

Presacral abscess

Abscess is one of the rare causes of sciatica or lumbosacral plexopathy developed in the form of pain starting from the gluteal area and lower lumbar area and spanning over to hip and calf due to compression of the sciatic nerve (26). Presacral abscess is a rare musculoskeletal system complication of the Crohn's disease. Clinic manifestation is occasionally devious and delay in diagnosis could increase morbidity (25). Iliac veins, psoas and iliac muscles are potential paths where abdominal infections spread to pelvis. Iliac veins are potential paths for abdominal infections to spread pelvis along with psoas and iliac muscles. In our case, the patient applied to our clinic for lower back pain and sciatica associated with a large presacral abscess caused by an osteomyelitis developed in the sacrum (Figure 4). The patient was diagnosed with presacral abscess with pelvic MRI. Then drained and remedied with appropriate antibiotics treatment. In patients with distinct pain of passive hip movements and sciatica yet with no lumbar disc disease, pelvic abscesses which could be easily diagnosed by means of computed tomography or magnetic resonance imaging must be considered. We have surmised that presacral abscess must be necessarily taken into consideration especially during the differential diagnosis of lower back pain and sciatica accompanied by high fever.

Arteriovenous malformation

As a finding of arteriovenous malformation (AVM), sciatica is rather rare. AMV's are rare lesions that could develop on almost any part of the body, though extremities, head and neck areas are more frequently affected. As the etiology may be congenital, it often develops subsequently (11). In our case there was a large arteriovenous malformation and the performed computed tomography scan showed that the sciatic nerve was compressed between AVM and the sciatic notch (Figure 5). Arteriovenous malformations must be considered for the differential diagnosis of unexplained sciatica. The diagnosis could easily be obtained by contrast-enhanced computed tomography (12).

Aneurysm of internal iliac artery

Internal iliac artery plays a major role particularly in blood supply of lumbar and sacral plexuses via the iliolumbar, lateral sacral, superior and inferior gluteal arterials (14).
Reports have been published indicating that sciatica or lumbosacral plexus disorders are developed secondarily to abdominal aortic aneurysm (15), internal iliac artery pseudoaneurysm (16), common iliac artery aneurysms (17), right or left internal iliac arterial aneurysm (3, 18). We are presenting a case with right internal iliac artery aneurysm which is a rare cause of sciatica. BT scan shows an internal iliac arterial aneurysm 3 cm in diameter that compresses the sciatic nerve. Patient was directed to vascular surgery service and operated. Aneurismal sac was repaired.
**Fig. 1:** Axial T2-weighted fat suppression images reveal sacroillitis of the left sacroiliac joint and neighboring edema pressing on the lumbosacral plexus (arrows).

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Fig. 2: Axial T1-weighted and sagittal T2-weighted images demonstrating a soft-tissue mass within the posterior femoral compartment, the close relation of the mass to the sciatic nerve is seen (arrows). Normal sciatic nerve is seen in the posterior area of right thigh (arrow head).

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Fig. 3: Axial T1-weighted image reveals hypertrophy of the left piriformis muscle and enlarged muscle pressing on the sciatic nerve (arrow).

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**Fig. 4:** Axial T2-weighted fat-suppression image and T1 weighted fat-suppression image following intravenous Gd administration show a contrast-enhancing signal increase consistent with sacral osteomyelitis and associated presacral abscess. In addition, a presacral cystic mass pressing on the left lumbosacral plexus is seen (arrow).

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**Fig. 5:** Axial CT image shows diffuse enlarged vascular collateral veins related to the arterio-venous malformation pressing on the left sciatic nerve at the level of great sciatic foramen (arrows).
Conclusion

Evaluation of the non-traumatic extraspinal sciatica causes presents very significant difficulties for clinicians and radiologists. Lumbar disc hernia is not the only cause of sciatica. Particularly, a detailed history focused on the characteristics of the pain is a substantial component of patient evaluation (2). In an incoming patient applied for sciatica complaints without any disc diseases, it should not be considered that the evaluation is complete without performing a full scan of sciatic nerve. The radiologist could make accurate decisions by means of being familiar with common and uncommon imaging of conditions that affect the sciatic nerve. Identified extraspinal non-traumatic sciatica causes may include tumors (9, 10), sacroiliitis (2, 4), iliac or gluteal artery aneurysms (16, 17), anorectal abscesses (28), avulsion fractures of ischial tuberosity (22), endometrioma in the pelvic cavity (23), piriformis syndrome (2, 5, 19, 20, 24, 30) and pseudomyxoma peritonei (21). We recommend performing MR and/or CT imaging of the entire course of sciatic nerve in order to investigate bone and soft tissue tumors in patients suspected for extraspinal causes. Early diagnosis of rarely seen causes of sciatica not only relieves elongated pains but also minimizes the number of unnecessary operations of vertebra. By the way this makes a positive and strong affect on the lifespan of the patient.

In our study the most common cause of sciatica was sacroiliitis. Malign and benign tumors were the second most common causes. We should remember sacroiliitis firstly in patient in whom extraspinal causes are suspected. Therefore, it is most significant for clinician and radiologists to be familiar with the MRI and CT characteristics and frequency of many benign and malign formations.
References


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