

Bertolotti's Syndrome: A cross sectional study to find out its prevalence in patients with low back pain and low bone mineral density

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Abstract

Background: Lower back ache is emerging as a major symptom among elderly, middle aged and adolescents. Lumbar sacral transitional vertebrae's are congenital spinal anomalies defined as either sacralisation of the lowest lumbar segment or lumbarisation of most superior sacral segment of spine. Variation in 5th lumbar vertebra having a spatulated transverse process on one side resulting in pseudoarticulation with sacrum or ileum including change in biochemical properties is known as Bertolotti's Syndrome. Bertolotti's syndrome affects 4% to 8% of the population.

Methods: A Cross Sectional study was carried out in 1000 Indian patients (419 males and 581 females) with T-score below -1 from July 2012 to June 2015 using Plain X-Ray film antero-posterior view of lumbar-sacral spine.

Results: On assessment, 62 patients (i.e. 6.2 %) were found suffering with Bertolotti's Syndrome including 24 males (i.e. 5.7%) and 38 females (i.e. 6.5 %). Prevalence of Bertolotti's Syndrome was found more in 55-65yrs age patients and females are found to be more affected than males.

Conclusion: Our study showed prevalence (6.2%) of Bertolotti syndrome in patients with low back pain with low bone mineral density is quite significant in Indian population and awareness about Bertolotti's Syndrome and early detection may prove to be helpful in choosing or avoiding certain professions or jobs.

Keywords: Articulation, Bertolotti's Syndrome, Lumbo sacral transitional vertebrae, Lower back ache, Prevalence.

1. Introduction

Lower back ache is emerging as a major symptom among middle aged and adolescents these days. This may be the impact of sedentary life, not maintaining proper posture and surrounding environment. Lower back pain may be due to congenital anomalies as well. Lumbar sacral transitional vertebrae's are congenital spinal anomalies defined as either sacralisation of the lowest lumbar segment or lumbarisation of the most superior sacral segment of spine.[1] Most commonly, the 5th lumbar vertebrae is involved which will have a spatulated transverse process on one side resulting in articulation with sacrum or with ilium or both. This results in limited altered motion at the lumbo-sacral articulation. This loss of motion will then be compensated for at segments superior to transitional vertebrae are resulting in accelerated degeneration and strain through L4 disc level which can become symptomatic and inflame the adjacent L5 nerve root resulting in sciatic or radicular pain patterns. This variant of lumbar and sacral spine including change in biochemical properties is called as Bertolotti's syndrome. Bertolotti's syndrome was first described by Mario Bertolotti in 1917. He

stated that these abnormal vertebrae may produce low back pain due to arthritic changes occurring at the site of pseudoarthrosis. Bertolotti's syndrome affects 4% to 8% of the population.[2] Lumbo sacral transitional vertebrae's are common in general population with a reported prevalence of 4% to 30%.[3] The causes of back pain in Bertolotti's syndrome are multifactorial. Most of the affected patients have scoliosis. Although not initially described, the low back pain of this syndrome is currently thought to be of varying etiologies, subsequently arising from different locations: 1) disk, spinal canal, and posterior element pathology at the level above a transition[4-6]; 2) degeneration of the anomalous articulation between an LSTV and the sacrum; 3) facet joint arthrosis contralateral to a unilateral fused or articulating LSTV[7]; and 4) extraforaminal stenosis secondary to the presence of a broadened transverse process.[7] The Castellvi classification [8] used for lumbosacral transitional vertebra (LSTV):

- Type I - enlarged and dysplastic transverse (at least 19 mm)
 - Ia - unilateral
 - Ib - bilateral

- Type II - pseudoarticulation of the transverse process and sacrum with incomplete lumbarisation / sacralisation; enlargement of the transverse process with pseudoarthrosis
 - IIa – unilateral
 - IIb - bilateral
- Type III - transverse process fuses with sacrum and there is complete lumbarisation or sacralisation, enlarged transverse process with complete fusion
 - IIIa - unilateral
 - IIIb - bilateral
- Type IV - type IIa on one side and type III on contralateral side

Diagnosis of Bertolotti's syndrome is based on radiological findings and their correlation with the clinical presentation. Plain X-rays of the lumbosacral spine in anteroposterior view are usually sufficient. Radicular features may necessitate an MRI for evaluation of prolapsed intervertebral disc (PIVD), which may co-occur [9]. The purpose of this study was to diagnose the patients with Bertolotti's syndrome so that they can be guided properly for treatment. Treatment of Bertolotti's syndrome constitutes a multilevel approach that includes: Fluoroscopically-guided steroid injection and / or local anesthetic blocks at the pseudoarticulation site, radiofrequency ablation (thermal) along the articulation, surgical excision of the large transverse process¹⁰ and minimally invasive paramedian tubular-based resection of the LSTV for Bertolotti's syndrome. Prevalence of Bertolotti Syndrome in patients with low back pain with low bone mineral density has not been done previously.

1.1 Aims and Objectives

- 1) To find out the prevalence of Bertolotti's syndrome in the patients having low back ache with low bone mineral density from the month of July 2012 to June 2015.
- 2) To compare the prevalence rate of Bertolotti's syndrome age wise.
- 3) To compare the prevalence rate of Bertolotti's syndrome sex wise.

2. Materials and Methods

2.1 Material

Subjects included in the study consists of total 1000 consecutive patients (419 males and 581 females) from the month of July 2012 to June 2015 in a renowned orthopedic hospital in the district of Udaipur (Rajasthan) and KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi (Karnataka) INDIA. All the patients were of Indian origin. Plain X-Ray film antero-posterior view of the lumbar-sacral spine of the patients having lower back ache with low bone mineral density i.e. T-Score below 1 were examined.

2.2 Methods

1000 Plain X-Ray film antero-posterior of lumbar-sacral spine were examined from the month of July 2012 to June 2015. Diagnosis was based on patient history of chronic low-back pain with low bone mineral density and radiographic findings. Assessment of changes in the lumbar-sacral vertebrae was done to find the patients of Bertolotti's syndrome. Age and Sex of the patients were also noted. A backache that was located in the midline with aggravation on forward bending

and axial loading was labeled as discogenic pain. Low Back Pain situated slightly paramedian and increasing on back extension and lateral rotation was labeled to be of facet joint origin. Low Back Pain with a positive Patrick's test, Gaenslen's test, and Yeoman's test was labeled as sacroiliitis. Neuralgic pain following a dermatomal pattern of leg pain was labelled as Prolapsed Inter Vertebral Disc. Patients who had undergone any previous surgery for Low Back Pain and below 45 years of age were excluded from the study.

2.3 Statistical Analysis

Prevalence of Bertolotti's Syndrome in lower back pain patients was calculated by using following formula.

Prevalence = Number of all current cases of specific disease existing at a given point in time x 100 / Estimated population at the same point in time.[11]

Also prevalence of Bertolotti's Syndrome in lower back ache patients was calculated for males and females, separately and age wise.

3. Results

Table I: Table showing prevalence of Bertolotti syndrome in patients with low back pain with low bone mineral density

	Total
Number of Patients Examined	1000
Number of Patients having Bertolotti's Syndrome	62
Prevalence of Bertolotti's Syndrome	6.2 %

Table II: Table showing Patients suffering from Bertolotti's Syndrome age wise

Sr. No	Age	Number of Patients Examined	Number of Patients having Bertolotti's Syndrome
1	45-55	241	18
2	55-65	368	28
3	65-75	269	10
4	75-85	109	6
5	Above 85	13	0

Table III: Table showing Patients suffering from Bertolotti's Syndrome Sex wise

	Total	Male	Female
Number of Patients Examined	1000	419	581
Number of Patients having Bertolotti's Syndrome	62	24	38
Prevalence of Bertolotti's Syndrome	6.2 %	5.7 %	6.5 %

4. Discussion

Bertolotti's syndrome is not an uncommon diagnosis in patients with refractory low back pain. Lower back ache is the 2nd most common symptom after fever. Lower back ache is one of the most common reasons for taking medical advice and 80% of adults seek help at some stage.[12,13] In any one year period 15 to 20% of the population are affected.[12] Lower back ache can have a major impact on one's day to day life. People suffering from this may not be able to perform their work as easily as other people. This can lead to depression and frustration. Their working capacity and ability may decline. Young aged people can have difficulties in getting into jobs

like military, police force and jobs requiring strenuous physical activity. If proper examination and timely treatment is not done, it can lead to worse. Bertolotti's Syndrome constitutes an important part of lower back pain. Also, low back ache is common in patients with low bone mineral density. Considering this, the study was conducted to determine prevalence of Bertolotti's Syndrome in total 1000 patients of lower back ache with low bone mineral density (419 males and 581 females) from the month of July 2012 to June 2015 in a renowned orthopedic hospital in the district of Udaipur (Rajasthan) and KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi (Karnataka) INDIA using Plain X-Ray film antero-posterior of lumbar-sacral spine. On assessment, total 62 patients (i.e. 6.2%) were found to be suffering with Bertolotti's Syndrome which included 24 males (i.e.5.7 %) and 38 females (i.e.6.5 %). All the patients complained of lower back pain. According to Castellvi classification used for lumbosacral transitional vertebra (LSTV): 15 Male patients and 27 Female patients were having Type IIa and 8 Male patient and 11 Female patients were classified Type IIb and 1 Male patient was classified in Type IIIa. From the study, it is observed that , prevalence of Bertolotti's Syndrome in females is slightly higher than in males and also it is observed that, prevalence of Bertolotti's Syndrome in patients with low back pain by this study is 6.2% which is higher to the prevalence observed in other studies. Our findings suggest that Bertolotti's syndrome must form part of a list of differential diagnoses in the investigation of low back pain in all people. LSTV increases the risk of early degeneration in the upper disc. The presence of transitional vertebrae should be noticed when morphologic methods are used in research on lumbosacral spine.[1] Sacroilitis is also an important cause of low back pain in patients with Bertolotti's syndrome, and this sacroilitis probably originates due to abnormal pelvic tilt as a result of scoliosis. Neoarticulation between the transverse process and the ilium is an additional pain-generating site in some patients. Disc degeneration is an important component in the pathophysiology of low back pain in Bertolotti's syndrome. The intervertebral disc most commonly involved is that of the L4-5 level, i.e., the level just above the level of hemisacralization. The possible explanation for this seems to be the restricted mobility at the level of hemisacralization leading to hypermobility at a level just superior to it. This hypermobility predisposes the intervertebral disc to degeneration. Minimally invasive techniques are increasingly being used for the treatment of adult degenerative disc disease and deformity of the lumbar spine. Application of minimal access spinal approaches list certain advantages over open procedures, including decreased postoperative pain and analgesic requirements, shorter hospital stays, less blood loss, and smaller incisions. Marks and Thulbourne[14] studied ten patients who received a steroid and local anaesthetic infiltration in their anomalous lumbosacral articulations for severe chronic low back pain. Immediate relief was registered in eight, but only one patient remained free from pain two

years later.[14] Santavirta *et al*[15] studied a series of 16 patients with low back pain and radiological evidence of an anomalous articulation. Eight underwent posterolateral fusion of the transitional segment and eight had a unilateral anomaly resected. After a mean follow-up of nine years, ten reported an improvement in their pain. The outcome was the same in each group. To date, there is no agreement as to the best method of treatment for Bertolotti's Syndrome patients. Low back pain in Bertolotti's Syndrome has been addressed by various methodologies but there is no consensus regarding definitive management. Consequently, the management of these patients remains uncertain. As far as the management of Bertolotti's Syndrome is concerned, one needs to develop a dynamic approach to pain management. Multiple interventions may be required to achieve and maintain adequate pain relief. In some patients, pain relief may not be attained even after maximum possible efforts. Psychological counseling may be of great help and needs to be explored further.

5. Conclusion

The prevalence of Bertolotti's Syndrome in this study was found to be 6.2% and was found more in 55-65 aged patients of lower back ache with low bone mineral density. Also females are found to be more affected than males. In many cases patient may ignore lower back ache which can result in devastating effect in future. Diagnosis of Bertolotti's syndrome should be considered with adequate patient history and imaging studies. Early detection of this syndrome may prevent further complications. Awareness about Bertolotti's Syndrome and its early detection may prove to be helpful in choosing or avoiding certain professions or jobs. Knowledge about Bertolotti's Syndrome can help orthopaedic surgeons during surgery at or near L5 level. During pedicle screw fixation at sacrum, prior information about this syndrome can prevent drastic complications. Considering the various aspects, this study is a step to know more about Bertolotti's Syndrome so as to help the patients with Bertolotti's Syndrome to know the problem and to get proper check-up and treatment.



Figure I: Plain X-ray Antero-Posterior view of Lumbo-sacral spine showing Right side unilateral Bertolotti's Syndrome



Figure II: Plain X-ray Antero-Posterior view of Lumbo-sacral spine showing bilateral Bertolotti's Syndrome

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