Volume: 25, Issue: 2, April 2014 pp.: 81-86 ORIGINAL ARTICLE / ORJİNAL MAKALE

RADIOGRAPHIC LUMBAR SPINE ABNORMALITIES IN AN ASYMPTOMATIC YOUNG POPULATION: A MULTICENTER PREVALENCE ANALYSIS

ASEMPTOMATİK GENÇ POPULASYONDA RADYOGRAFİK LOMBER VERTEBRA ANOMALİSİ SIKLIĞI: ÇOK MERKEZLİ PREVALANS ÇALIŞMASI

Davud YASMİN[1],
H. Yener ERKEN[2],
Halil BURÇ[3],
Kenan KEKLIKÇI[4],
Mehmet AYDOĞAN[5]

[1]Surgeon, Çınar Mahallesi Pelit sok. No:2 / 7 Hüsnü bey Apt. İdealtepe / İstanbul
[2]Surgeon, Anadolu Health Center Hospital Orthopedics and Traumatology Clinics, Kocaeli, Türkiye
[3]Assist. Prof. Dr., Süleyman Demirel Üniversitesi Tıp Fakültesi Orthopedics and Traumatology Clinics, Isparta Türkiye
[4]Assist. Prof. Dr., GATA Haydarpaşa Training Hospital, Orthopedics and Traumatology Clinics, Istanbul Türkiye
[5]Assoc. Prof. Dr., Bosphorus Spine Center, Istanbul, Türkiye

SUMMARY

Objectives: To determine the prevalence of lumbar vertebral abnormalities in asymptomatic young population.

Materials and Methods: This study included 1,442 male subjects who underwent a physical examination as part of their application to military school between 2005 and 2011. The mean age was 16.16 (13–20) years. Spinal anomalies were evaluated with antero-posterior X-ray images, from the 11–12th dorsal vertebrae down to the lumbar and sacral vertebrae, the pelvis and bilateral proximal femur. Images were evaluated to detect any lumbar spinal anomalies.

Results: Radiological abnormalities were detected in 238 cases, including posterior fusion defects in 150 cases (10.4%), transitional vertebrae in 75 cases (5.2%), scoliosis in 11 cases (0.76%), and block vertebrae in two cases (0.16%). The most common lumbar spinal anomaly was S1 spina bifida (n=105, 7.5%).

Conclusion: Since this study was designed as a cross- sectional study, our results don't reflect the incidence in the whole population. However, this study provides valuable information about the prevalence of radiological abnormalities in an asymptomatic young population, which may help to form a database for future studies.

Keywords: Lower back pain; lumbar transitional vertebra; lumbosacral region problems; spina bifida

Level of evidence: Retrospective clinical study, Level IV

ÖZET

Amaç: Asemptomatik genç nüfusta lomber vertebra anomali sıklığının saptanmasıdır.

Olgular ve Yöntem: Çalışma 2005-2011 tarihleri arasında askeri öğrenci olmak için askeri hastanelere başvuran 1442 asemptomatik erkek olgu üzerinde yapılmıştır. Olguların yaş ortalamasının 16.16 (13-20) olduğu belirlenmiştir. Olgular 11-12 dorsal vertebralardan başlayıp tüm lomber ve sakral vertebraları, pelvisi, her iki femur üst ucunu gösteren direkt ön-arka grafiler çekilerek incelenmiştir. Grafilerde lomber spinal anomaliler araştırılmıştır.

Sonuçlar: 1442 olgunun 238'inde radyolojik anomali saptanmıştır. 150 olguda (% 10.4) posterior füzyon defekti, 75 olguda (% 5.2) geçiş vertebra, 11 olguda (% 0.76) skolyoz, 2 olguda (% 0.16) blok vertebra tespit edilmiştir. En sık rastlanan lomber spinal anomali olarak S1 spina bifida (105 olgu - % 7.5) tespit edilmiştir.

Çıkarımlar: Bu çalışmada, elde edilen sonuçlar Türk toplumu için lumbosakral bileşke anomali insidansını ortaya koymamakla birlikte, kesitsel geniş bir seride genç adölesan sağlıklı bireylerde, asemptomatik spina bifida gibi birleşme defektlerinin ve geçiş (transizyonel) vertebra problemlerinin prevalansının azımsanmayacak bir oranda (% 15.6) olduğu belirlenmiştir. Ne var ki bu sonucun ileride yapılacak daha geniş katılımlı insidans çalışmaları ile doğrulanması önem arz etmektedir.

Anahtar kelimeler: Bel ağrısı, geçiş vertebrası, sakralizasyon, lumbosakral bileşke problemleri, spina bifida

Kanıt düzeyi: Retrospektif klinik çalışma, Düzey IV

Address: Davud Yasmin, Çınar Mahallesi Pelit Sok. No:2/7 Hüsnü Bey Apt. İdealtepe / İstanbul
Tel: 0 216 4898651
Gsm: 0 555 2874778
E-mail: davudyasmin@yahoo.com
Received: 12th December, 2013
Accepted: 29th January, 2014

INTRODUCTION:

Lower back pain is one of the most commonly encountered problems nowadays, and affects an individual's contribution to the workforce. There are various diseases in the etiology of lower back pain. Congenital vertebral abnormalities, detected radiologically, are an important group of diseases in the etiology, but congenital vertebral abnormalities do not always result in lower back pain[1]. In this study, the prevalence of lumbar vertebral abnormalities is assessed in a young population who had no complaints and who were selected randomly.

CASES AND METHOD:

This study was conducted on 1,442 asymptomatic individuals who applied to be a student in military school between 2005 and 2011, and who received physical examination and routine X-rays. All the cases were male and the mean age was 16.16 (13–20) years.

Radiological examination was performed on ambulant antero-posterior X-rays, also known as direct urinary system X-rays, showing the lumbosacral vertebrae. The X-rays showed all lumbar and sacral vertebrae, starting from the 11-12th dorsal vertebrae, and showing the pelvis and both femur upper ends in detail. While the X-rays were taken, the distance between the cassette and the tube was set at 1 meter. The spinal protrusions of the vertebrae, arcus, body, joints and sacrum were analyzed in detail from the X-rays, and they were evaluated in terms of spina bifida occulta, lumbarization, sacralization, and scoliosis. All the X-rays were evaluated by the same orthopedist and radiologist. For X-rays where there was a difference in the opinion, they were evaluated by a second orthopedist or radiologist.

During the radiological examination, spina bifida was defined as a congenital defect in the rear elements of the vertebral column, scoliosis was defined as curvature of more than 10° in the frontal plane on measurement with the Cobb method, sacralization was defined as the joining of the transverse protrusion of the fifth lumbar vertebra with the sacral segment, eitherunilaterally or bilaterally, obtaining sacral segment characteristics, and lumbarization was defined as the formation of a protrusion of the first sacral vertebral body, either unilaterally or bilaterally[2].

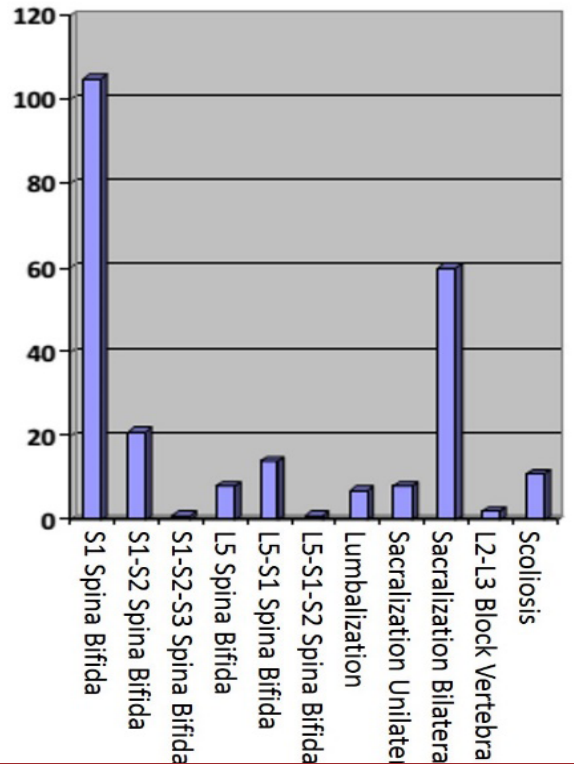
Posterior fusion defects were evaluated in five main groups:

1. Patients with a defect in only one of the sacral vertebrae (Group 1);
2. Patients with a defect in more than one of the sacral vertebrae (Group 2);
3. Patients with a defect in only one of the lumbar vertebrae (Group 3);
4. Patients with a defect in more than one of the lumbar vertebrae (Group 4);
5. Patients with defects in both the lumbar and sacral vertebrae (Group 5).

Table-1. Numerical and proportional distribution of the cases

Observed radiological abnormality		Number of patients	Proportion (%)
Posterior fusion defect		Total 150	10.4
Group 1	S1 Spina bifida	105	7.2
Group 2	S1-S2 Spina bifida	21	1.4
	S1-S2-S3 Spina bifida	1	0.06
Group 3	L5 Spina bifida	8	0.55
Group 4	-	0	0
Group 5	L5-S1 Spina bifida	14	0.97
	L5-S1-S2 Spina bifida	1	0.06
Transitional vertebra		Total 75	5.2
Lumbarization		7	0.48
Sacralization (Unilateral)		8	0.55
Sacralization (Bilateral)		60	4.16
Block vertebra			
L2-L3		2	0.13
Scoliosis		11	0.76
Healthy		1204	83.4

Figure-1. Graphical distribution of cases



RESULTS:

Radiological abnormalities were detected in 238 of 1,442 cases. The distribution of the cases can be seen in Table-1 and Figure-1. A posterior fusion defect was detected in 150 cases (10.4%), transitional vertebrae in 75 cases (5.2%), scoliosis in 11 cases (0.76%), and block vertebrae in two cases (0.16%). The most commonly encountered lumbar abnormality was S1 spina bifida (105 cases, 7.5%).

DISCUSSION:

Lower back pain is one of the most common reasons for patients to apply to orthopedics clinics nowadays. The etiological spectrum of lower back pain is rather large. Congenital vertebral abnormalities are a significant group in the etiology.

In the literature, no definite clarification can be found as to which abnormalities lead to chronic lower back pain or a predisposition to other vertebral abnormalities. It has been suggested that congenital vertebral abnormalities do not always cause lower back pain[1,3]. Taking this into account, we analyzed the prevalence of developmental vertebral abnormalities in asymptomatic healthy individuals. We detected that there have been three studies previously published in the literature on this subject in Turkey [4,6].

There were no previous lower back pain complaints of any of the cases included in the study. As the patient group consisted of military student candidates, who may downplay any symptoms, the cases were evaluated in terms of the abnormality prevalence and localization, rather than any clinical symptoms.

The vertebral abnormality prevalence detected in our study was 16.6%. This rate shows a similarity to the literature. However, when we consider the vertebral abnormality subgroups, some of them show a different prevalence to that seen in other studies. The most commonly observed abnormality in our study was a posterior fusion defect, which was seen at a rate of 10.4%. The most common location for this is the sacral first vertebra. Eren et al.[6] detected this at a rate of 14.3% in their study conducted on 1,500 asymptomatic military student candidates, and they observed it most commonly in the sacral first vertebra. Okçu et al.[5] saw this at a rate of 15% in 130 cases, and Güven et al.[4] saw it at a rate of 4.8% in 1,000 cases (age range: 14–92) with X-ray archive scanning. Gregerson[7], on the other hand, reported the rate of spina bifida as 17%. To clarify this apparent difference between the spina bifida rates, it is important to scan a number of X-ray films to more accurately determine the abnormality incidence.

The spina bifida rate depends on age, and closure with the progression of age is observed in 40% of cases with spina bifida. Thus, there is a need for studies that include specific age groups, rather than studies including a wide range of age groups. As our study was conducted in an adolescent age group, this will aid clarification, along with studies to be conducted in the future.

Eren et al.8 detected the congenital abnormality rate as 20.7%, and encountered transitional vertebral abnormalities most commonly (11.4%). They stated that sacralization is observed much more commonly than transitional vertebral abnormalities. Güven et al.4 reported that the most commonly observed radiological appearance of patients experiencing lower back pain was transitional vertebral abnormalities. This rate was found to be low in our study, as our study population consisted of asymptomatic individuals. In our series, transitional vertebral abnormalities were seen at a rate of 5.2%, and sacralization was most commonly detected. These results are similar to those of other studies conducted on asymptomatic cases. Eren et al.6 detected the rate of transitional vertebral anomalies as 5.5% (most commonly sacralization, at a rate of 4.9%), and Frymoyer et al.3 detected them at a rate of 5.8%.

The rate of scoliosis is low in our series (0.76%) compared to other studies. Eren et al.[6] reported the rate of scoliosis as 3.3% (in their study, they considered curvature of more than 10°

as scoliosis), Froymer et al.[3] reported the rate as 39% (considering scoliosis as more than 5° of curvature), and Güven et al.[4] reported the rate as 10.7% (considering more than 5° of curvature as scoliosis). We think that the reason for the low rate of scoliosis seen in our study is due to the fact that we defined scoliosis as more than 10° of curvature, and candidates with serious curvatures were eliminated in the pre-health examinations and were not included in the study.

Coincidentally, two L2–3 block vertebrae were encountered in our study. To determine the prevalence of this, studies that include a greater number of cases are required.

Congenital vertebral abnormalities were detected radiographically at a rate of 16.6% in our study. The most commonly observed vertebral abnormality was S1 spina bifida (7.2%). In this study, although the results obtained do not represent the incidence of lumbosacral joint abnormalities in the Turkish population, it was detected that joining defects such as asymptomatic spina bifida and transitional vertebral problems are seen at a considerable rate (15.6%) in a cross-sectional large series including young healthy adolescent individuals. However, it is crucial to confirm this result with an incidence study with broad participation.

REFERENCES

1. Elmalı N, Saraç K, Baysal T, Kaygusuz MA, Öztürk S. Lomber vertebra garfilerinin bel ağrısındaki yeri. *Turgut Özal Tıp Merkezi Dergisi* 1995; 2(1): 32-36.
2. Jones DM, Tearse DS, el-Khoury GY, Kathol MH, Brandser EA. Radiographic abnormalities of the lumbar spine in college football players. A comparative analysis. *Am J Sports Med* 1999; 27: 335-338.
3. Frymoyer JW, Newberg A, Pope MH, Wilder DG, Clements J, MacPherson B. Spine radiographs in patients with low back pain. An epidemiological study in men. *J Bone Joint Surg* 1984; 66-A: 1048-1055.
4. Güven O, Esemenli T, Karahan M, Meçikoğlu M. En çok görülen lumbar vertebra anomalileri. Ege R (editör). *XII. Milli Türk Ortopedi ve Travmatoloji Kongre Kitabı*, 21-24 Nisan 1991; Aydın, Türkiye. Ankara, THK Basımevi, 1991: 588-591.
5. Okçu G, Yercan H, Yorulmaz İ, Erkan S, Öziç U. Lomber omurganın sagital planda radyolojik analizi. Ege R (editör). *XVI. Milli Türk Ortopedi ve Travmatoloji Kongre Kitabı*, 3-7 Kasım 1999; Antalya, Türkiye. Ankara, Sargın Ofset, 1999: 741-746.
6. Eren OT, Heybeli N, Okan E. Asemptomatik askeri öğrenci adaylarında radyografik lomber omurga anomalileri: 1500 olguda sıklık araştırılması. *Acta Orthop Trauma Turcica* 2001; 35: 130-134.
7. Gregerson DM. Clinical consequences of spina bifida occulta. *J Manipulative Physiol Ther 1997*; 20: 546-50.
8. Erden E, Güven Z, Kayhan Ö. Türk toplumunda bel ve bacak ağrılı olgularda radyopatolojik bulgular. *Türkiye Fiziksel Tıp ve Rehabilitasyon Dergisi* 1994; 18(3): 192-195.