



Low back complaints worse, but not more frequent in subjects with congenital lumbosacral malformations : a study on 5000 recruits

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The authors studied the plain radiographs and medical records of 5000 military recruits, mean age 19.1 years (range : 18 to 22), screened in a Turkish Military Hospital in the period November 2008-October 2009. They focused on the incidence of congenital lumbosacral malformations, such as spina bifida occulta and transitional vertebra, trying to find a correlation with subsequent low back complaints. Only 80 out of 748 subjects (10.7%) with low back complaints had one or more malformations, versus 744 out of 4252 subjects (17.5%) without low back complaints. This pleaded against a correlation between malformations and low back disorders. Also the literature is completely divided as to this problem, which means that there is probably no correlation at all. Interestingly, the 80 subjects with low back complaints and malformation estimated their pain level at +/- 4.6 on a Visual Analog Scale for pain, while the 668 with low back complaints but without malformation estimated their pain level at only +/- 2.2 ($p = 0.007$). At least two other studies led to the same conclusion. This paradox might be due to the fact that congenital malformations concentrate all external stress on the adjacent levels.

Keywords : congenital lumbosacral malformation ; spina bifida occulta ; transitional vertebra ; low back pain.

INTRODUCTION

Much controversy exists about whether congenital lumbosacral malformations such as spina bifida occulta and transitional vertebra (lumbarization or

sacralization) play a role in the pathogenesis of low back pain. Some authors (4,9,11,12,14,18) feel that they might play a role in the pathogenesis of low back disorders. Avrahami *et al* (1) found that patients with spina bifida occulta S1 showed a significantly higher incidence ($p < 0.001$) of posterior disc herniation, which increased with age. This may be explained by instability of the base of the lumbar spine caused by the spina bifida. Also Otani *et al* (11) found a significantly higher incidence of spina bifida in patients with low back pain and sciatica than in a control group without complaints.

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Luoma *et al* (8) noted that lumbosacral transitional vertebra increases the risk of early degeneration in the adjacent disc.

The incidence of spina bifida occulta has been estimated at 0.6 to 30% (1,13,16,18) ; the incidence of transitional vertebra at 4 to 24% (2,7).

PATIENTS AND METHODS

Five thousand military recruits, mean age 19.1 years (range : 18 to 22), were entered into the study, in the period November 2008-October 2009, after exclusion of those who had pre-existing lumbar disc hernia, lumbosacral surgery, spondylolisthesis, sacroiliitis, scoliosis, or systemic diseases resulting in an abnormal CRP value. They underwent a routine medical screening in a military hospital, consisting of, among others, antero-posterior and lateral radiographs of the sacrolumbar spine. The radiographs were checked for spina bifida occulta, transitional vertebra (lumbarization or sacralization), or a combination of both. Subsequently all recruits who went through a period of at least 4 weeks of low back pain, with or without nerve root symptoms, were asked to evaluate their pain level by means of a 0-10 cm Visual Analog Scale (VAS).

A t-test and a Mann-Whitney test were used for statistical computation of the data. A p value < 0.05 was considered as significant.

RESULTS AND DISCUSSION

One would expect that, if congenital lumbosacral malformations would play a role in the pathogenesis of low back pain, they would be more frequent

among low back pain patients than in the normal population. As mentioned, 5000 recruits were included in the current study. Of these 5000, 748 had low back complaints, while 4252 had not. Among the 748 subjects with low back pain, only 80 or 10.7% had a congenital lumbosacral malformation. On the other hand, among the 4252 without complaints, 744 or 17.5% had a malformation : distinctly more. This is an argument against the hypothesis that malformations would play a role in the *pathogenesis* of low back pain. Also van Tulder *et al* (17) concluded from a literature search that the data were completely controversial.

Immediately a question arises : “If we limit ourselves to the 748 subjects with back pain, what was the pain intensity in those without malformation versus those with malformation?”. The VAS score for back pain (Table I) averaged 2.2 ± 1.2 (range : 0.4-6.3) in the 668 subjects without lumbosacral malformations, and – strangely enough – 4.6 ± 1.4 (range : 1.6-9.1) in the 80 with malformations. The difference was very significant ($p = 0.007$). In other words, subjects with congenital malformations suffered more intensively from their back problem than those without malformations, although they had less chances to be involved. Magora *et al* (9) and Taskaynatan *et al* (16) also came to this conclusion. This paradox might be due to the fact that congenital malformations concentrate all external stress on the adjacent levels. This vision deserves further exploration.

Similarly, a comparison was made between the 65 subjects *without* malformation, but with back

Table I. — Distribution of all subjects with low back complaints

	No malf.	Transitional vertebra		Spina bifida occulta		Trans. vertebra + spina bif.	Total
		Sacralization	Lumbarization	L5	S1		
Number	668	34	7	6	30	3	748
Mean age	18,9	19,7	20	19,1	18,9	19	19,1
%	13.4	0.7	0.1	0.1	0.6	0.06	14.96
VAS		4.8 ± 1.9	4.7 ± 1.0	4.5 ± 0.8	4.4 ± 1.1	5.4 ± 1.4	
	2.2 ± 1.2	(80 subjects) 4.6 ± 1.4 ($p = 0.007$)					2.5 ± 1.3

malf. = Congenital lumbosacral malformation ; Trans. = transitional.

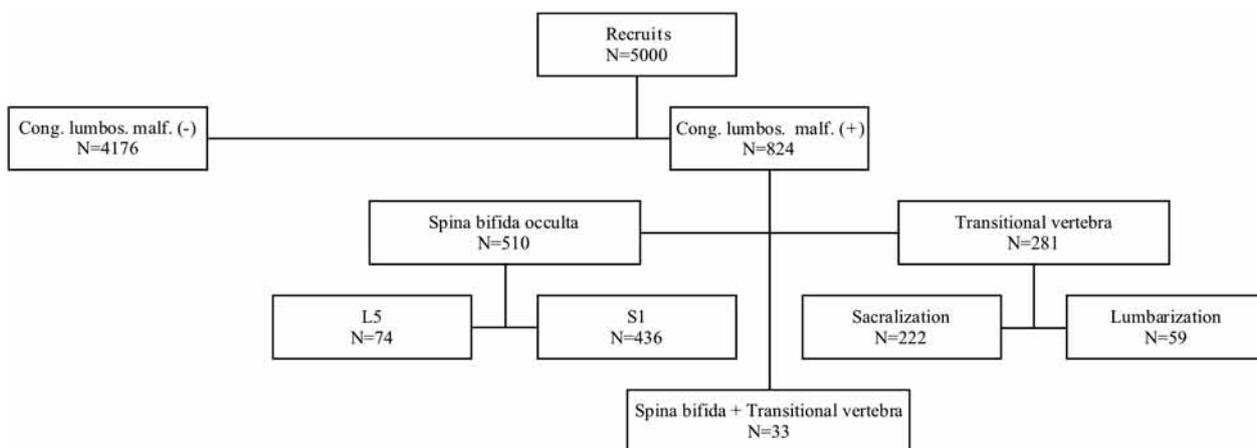


Fig. 1. — Distribution of subjects with and without congenital lumbosacral malformation

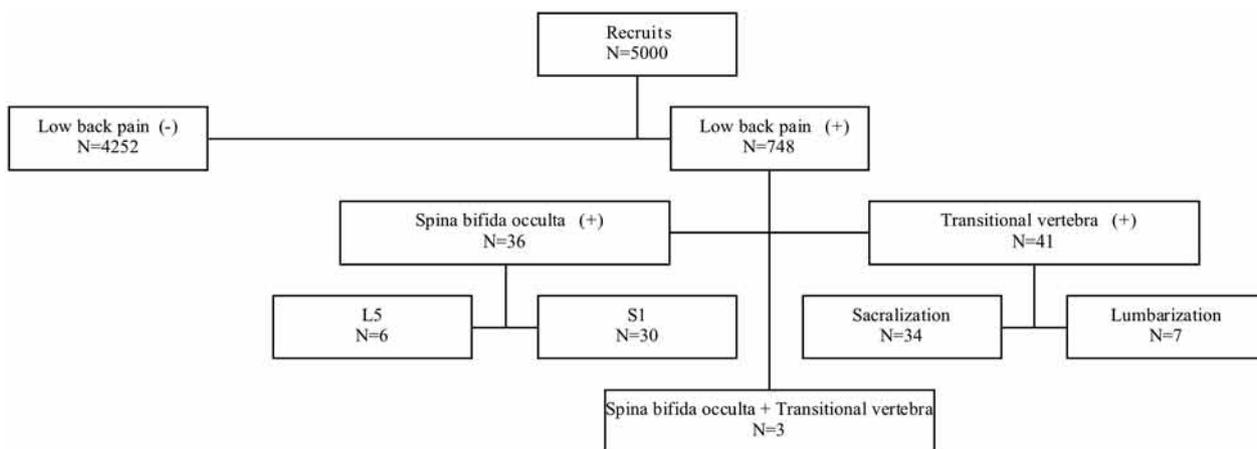


Fig. 2. — Distribution of subjects with and without low back pain

complaints and root signs, and the 15 subjects with malformation, plus back complaints and root signs : again the latter group suffered (even) more pronounced pain : VAS 5.6 ± 1.2 versus 3.9 ± 1.1 : $p < 0.001$.

A further step was to check whether sacralization, lumbarization, spina bifida L5, spina bifida S1, or a combination of transitional vertebra and spina bifida would lead to different pain levels (Table I). But the VAS score for pain was practically the same for all sub-groups, about 4.5, although it reached 5.4 ± 1.4 in the combined group.

A strength of this study was the fact that a large number of subjects could be studied.

REFERENCES

1. Avrahami E, Frishman E, Fridman Z, Azor M. Spina bifida occulta of S1 is not an innocent finding. *Spine* 1994 ; 19 : 12-15.
2. Bertolotti M. Contribution to the knowledge of spinal malformations, with special reference to the sacralization of the last lumbar vertebra. *La Radiologia Medica* 1917 ; 4 : 113-144.
3. Bonaiuti D, Faccenda I, Flores A. Sacralization of the 5th lumbar vertebra and backache : what's the possible relationship ? *Med Lav* 1997 ; 88 : 226-236.
4. Dai L. Lumbosacral transitional vertebrae and low back pain. *Bull Hosp Jt Dis* 1999 ; 58 : 191-193.
5. Deyo RA, Weinstein JN. Low back pain. *N Engl J Med* 2001 ; 344 : 363-370.

6. **Furlan AD, Clarke J, Esmail R et al.** A critical review of reviews on the treatment of chronic low back pain. *Spine* 2001 ; 26 : 155-162.
7. **Lorber J, Levick K.** Spina bifida cystica. Incidence of spina bifida occulta in parents and in controls. *Arch Dis Child* 1967 ; 42 : 171-173.
8. **Luoma K, Vehmas T, Raininko R, Luukkonen R, Riihimäki H.** Lumbosacral transitional vertebra : relation to disc degeneration and low back pain. *Spine* 2004 ; 29 : 200-205.
9. **Magora A, Schwartz A.** Relation between the low back pain syndrome and x-ray findings. 3. Spina bifida occulta. *Scand J Rehabil Med* 1980 ; 12 : 9-15.
10. **Oguz H, Akkus S, Tarhan S, Açikgözoğlu S, Kerman M.** Measurement of spinal canal diameters in young subjects with lumbosacral transitional vertebrae. *Eur Spine J* 2002 ; 11 : 115-118.
11. **Otani K, Konno S, Kikuchi S.** Lumbosacral transitional vertebrae and nerve-root symptoms. *J Bone Joint Surg* 2001 ; 83-B : 1137-1140.
12. **Resnick D, Niwayama G.** Degenerative disease of the spine. In : Resnick D, editor. *Bone and Joint Imaging*. 1st ed, Vol 1. WB Saunders, Philadelphia, 1992, pp 413-439.
13. **Saluja PG.** The incidence of spina bifida occulta in a historic and a modern London population. *J Anat* 1988 ; 158 : 91-93.
14. **Seçer M, Muradov JM, Dalgıç A.** Evaluation of congenital lumbosacral malformations and neurological findings in patients with low back pain. *Turk Neurosurg* 2009 ; 19 : 145-148.
15. **Sutow WW, Pryde AW.** Incidence of spina bifida occulta in relation to age. *Ama J Dis Child* 1956 ; 91 : 211-217.
16. **Taskaynatan MA, Izci Y, Ozgul A et al.** Clinical significance of congenital lumbosacral malformations in young male population with prolonged low back pain. *Spine* 2005 ; 30 : E210-E213.
17. **van Tulder MW, Assendelft WJ, Koes BW, Bouter LM.** Spinal radiographic findings and nonspecific low back pain. A systematic review of observational studies. *Spine* 1997 ; 22 : 427-434.
18. **Vergauwen S, Parizel PM, van Breusegem L et al.** Distribution and incidence of degenerative spine changes in patients with a lumbo-sacral transitional vertebra. *Eur Spine J* 1997 ; 6 :168-172.