ORIGINAL ARTICLE

Anatomical Descriptive Study of 337 Thoracic Disc Herniations

Francisco Javier Pérez Lara[1], M. Verdejo Parrilla[2], A. Ferrer Berges[3], J. M. Hernández Gonzalez[1], H. Oehling de Los Reyes[4]

[1]Digestive Surgeon, Service of Surgery, Hospital de Antequera, Málaga, Spain, [2]Traumatologist, Traumatology Service, Antequera Hospital, Málaga, Spain, [3]Plastic Surgeon Surgery, Málaga Universitary Hospital, Málaga, Spain, [4]Chief of Surgery Service, Hospital de Antequera, Málaga, Spain

ABSTRACT

Introduction: Conventionally, thoracic disc herniation has been viewed as a very rare pathology, and the few cases considered were considered to have a very low frequency of symptoms. However, new imaging methods show that the frequency of this pathology is quite high and also that its symptoms are encountered much more frequently than expected (since previously only neurological symptoms were taken into account). In view of these considerations, we conducted an anatomical descriptive study of this circumstance. **Methods:** A retrospective study was conducted to review all the nuclear magnetic resonance examinations made of the vertebral column at our hospital between October 2009 and October 2013. For this purpose, we selected the cases that presented herniated thoracic disc (HDT) and studied the social factors involved, the anatomical locations and the effects produced on nerve structures. **Results:** The sample consisted of 165 subjects, 95 men and 70 women, who presented a total of 337 HDT, with an average of 2.042 injuries per patient. We describe the most frequent locations, effects, and relationship to sex and age. **Conclusions:** We believe it is of interest to determine the anatomical details of this type of herniation, in view of recent knowledge obtained concerning its high frequency and the clinical significance of this information.

Key words: Anatomy, thoracic disc hernia, level

INTRODUCTION

Herniated thoracic disc (HDT) is observed more frequently in patients in their middle to late adult life, with no significant differences by gender.[1,2] Conventionally, such hernias have been considered to occur infrequently, representing 0.24–0.75% of all herniated discs, with an overall incidence of 1/1,000,000 patients per year.[3]

However, new advances in imaging tests have revealed that HDT is no longer considered rare, and a prevalence of 11–37% has been demonstrated.[4-7] Nevertheless, only 0.5–0.8% of cases are considered symptomatic.[8,9]

At present, in most cases, only neurological symptoms of HDT are considered (no detailed examination is made of whether the patient has abdominal pain or digestive urological symptoms). When all of these symptoms are taken into account, the percentage of symptomatic patients may well be much higher.[10,11]

Therefore, herniated dorsal discs are more common than previously thought and present a broader symptomatology than described. For these reasons, we believe it of interest to conduct an anatomical descriptive study of this clinical entity.

METHODS

In this retrospective study, we reviewed all the nuclear magnetic resonance examinations of the dorsal column performed at our hospital between October 2009 and October 2013 and selected the patients in whom thoracic disc herniation or protrusion was detected.

Address for correspondence:
Francisco Javier Pérez Lara, Hospital de Antequera, Secretaría de Cirugía (3º planta), Avenida Poeta Muñoz Rojas s/n, Antequera, Málaga, 29200, Spain. Tel.: 668830533. E-mail: javinewyork@hotmail.com

An anatomical descriptive study was performed of the lesions observed, and the following parameters were assessed: Sex, age, level of involvement, hernia size (small, medium, and large), disc location (generalized, central, right paracentral, and left paracentral), obliteration of the anal canal, contact with bone marrow, and impact on nerve structures.

RESULTS

The sample consisted of 165 subjects, 95 men and 70 women, who presented a total of 337 HDT, with an average of 2.042 lesions in each case 2.1 in the men (208 hernias) and 1.84 in the women (129 hernias). The patients' average age was 54.1 years (men, 56.02 years and women, 49.73 years). The detailed distribution of the hernias by sex and age is shown in Figure 1. Among patients aged under 35 years, such hernias are more frequent in women; over this age, they occur more frequently in men. Among both men and women, these hernias are most frequent in persons aged over 51 years. Logically, the distribution of sexes by age also reflects these frequencies [Figure 2].

With regard to size, in men, the smallest protrusions were most frequent at all ages, followed by medium-sized ones,

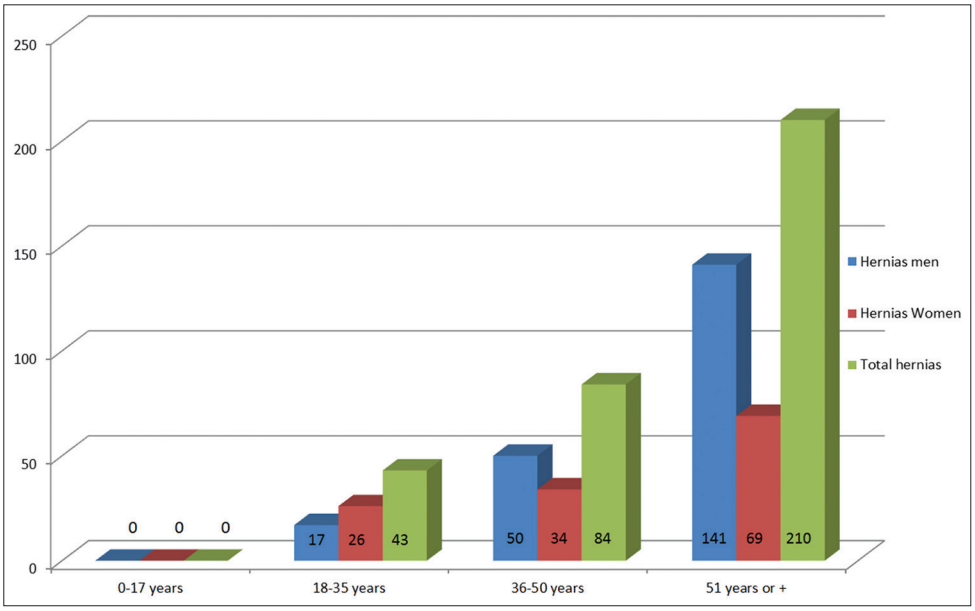


Figure 1: Distribution of hernias by sex, according to age

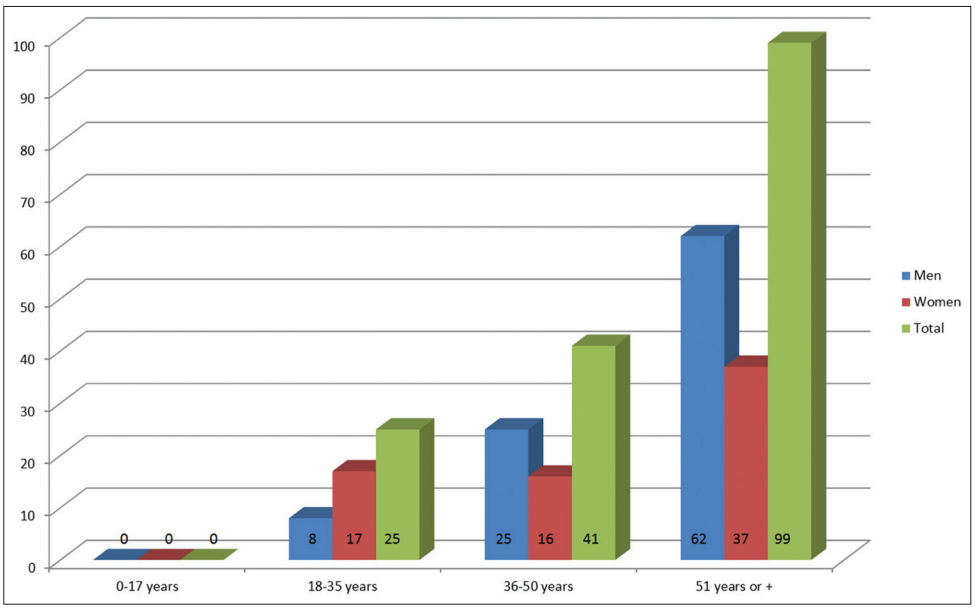


Figure 2: Sex distribution by age

with large hernias being quite rare [Figure 3]. On the other hand, in women, medium-sized protrusions were most commonly encountered among those aged 18–35 years and >51 years [Figure 4].

The distribution by the levels and types of hernia [Figure 5] shows that there is a greater frequency of central hernias. Posterolateral ones are, in general, more frequent on the left side, and global protrusions of the disc are the least frequently observed.

Of the 337 hernias considered, the majority (329) did not produce lesions to nerve structures. Only six cases revealed root damage, while in two cases, there was injury to the spinal cord [Figure 6].

DISCUSSION

HDT was first described in 1911, by Middleton and Teacher.[12] Since then, numerous case reports have been published, especially in relation to surgical approaches.

Since symptomatic HDT was first described by Key in 1938, this infrequent pathology has been a challenge for spinal surgeons.[13] Both its diagnosis and treatment are controversial, due to the low prevalence described the great variety of clinical presentations and the contradictory definitions of disc symptoms.[14]

High-resolution magnetic resonance (HRMN) imaging has increased the frequency of radiological diagnosis of HDT. In

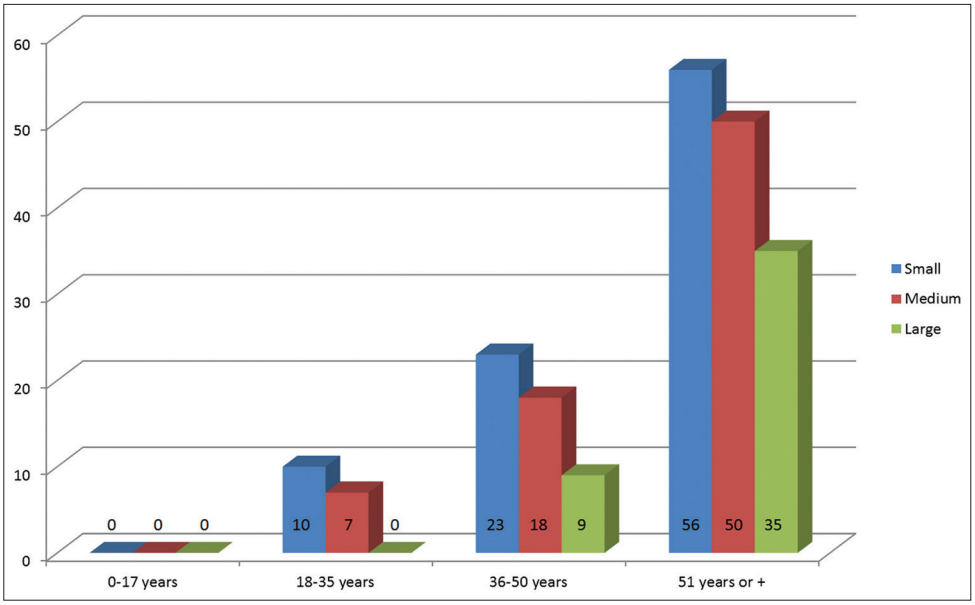


Figure 3: Size of hernias according to age in men

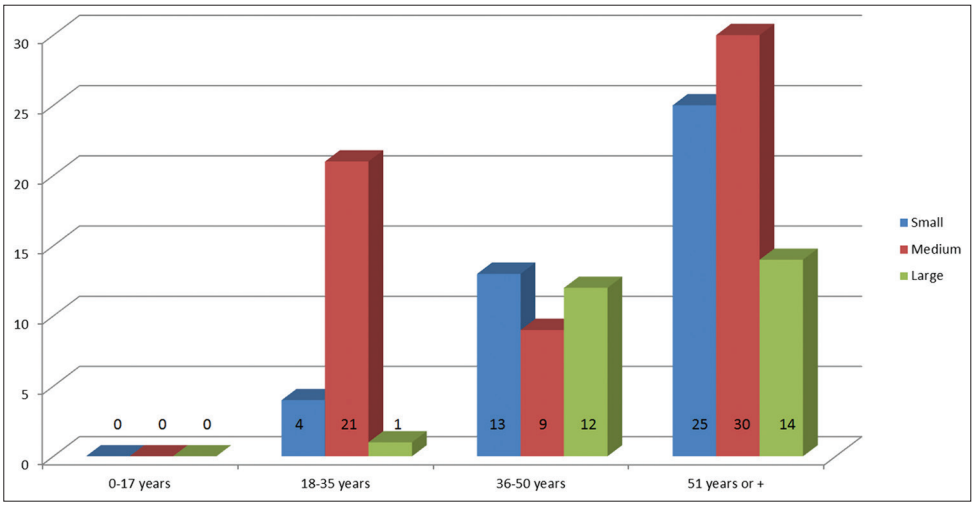
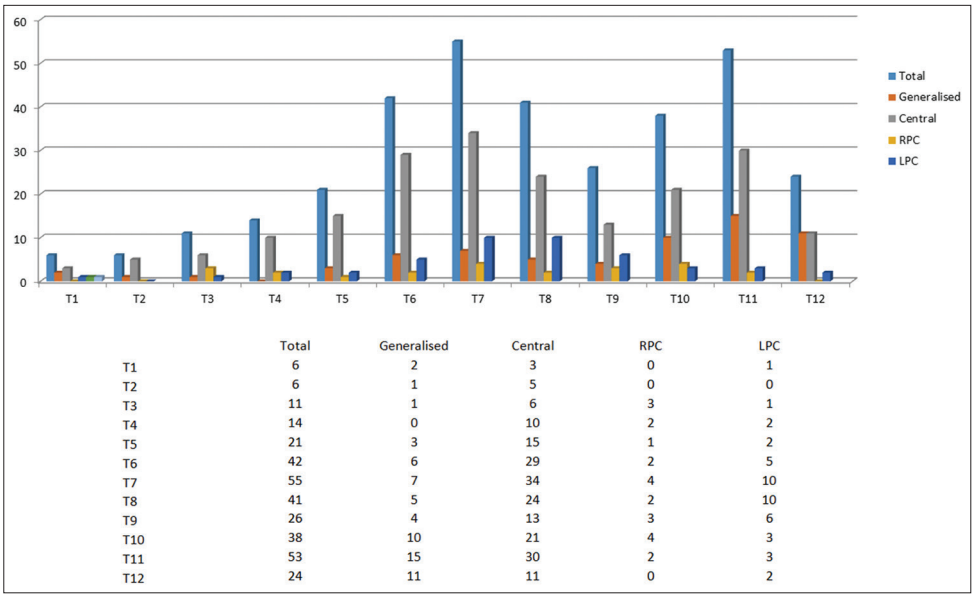


Figure 4: Size of hernias according to age in women



	Total	Generalised	Central	RPC	LPC
T1	6	2	3	0	1
T2	6	1	5	0	0
T3	11	1	6	3	1
T4	14	0	10	2	2
T5	21	3	15	1	2
T6	42	6	29	2	5
T7	55	7	34	4	10
T8	41	5	24	2	10
T9	26	4	13	3	6
T10	38	10	21	4	3
T11	53	15	30	2	3
T12	24	11	11	0	2

Figure 5: Distribution by the levels and type of hernia

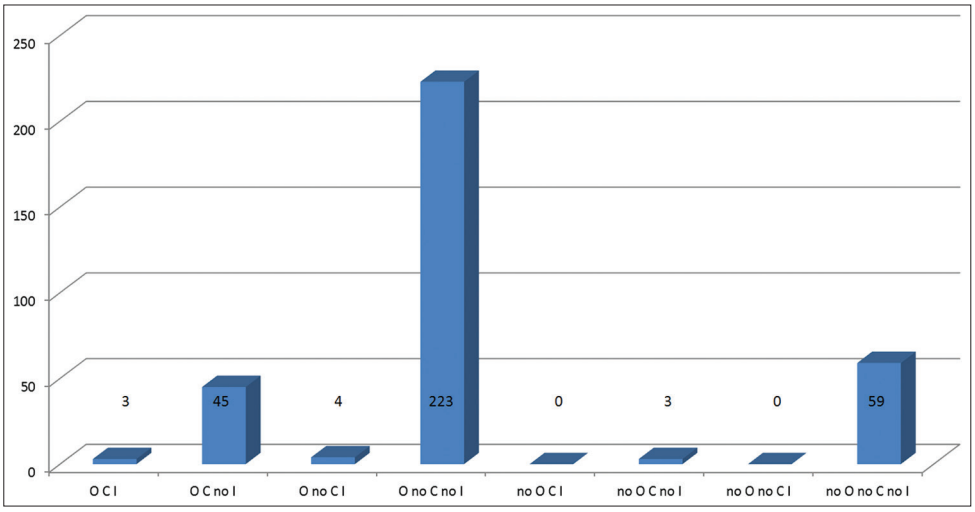


Figure 6: Type of nerve involvement provoked by hernias. O=obliteration of the anal canal, C=contact with bone marrow, and I=impact on nerve structures

a previous study,[15] we reported that the frequency of this pathology is quite significant, and when we interviewed the patients affected, practically all of them were found to be symptomatic.

Therefore, the identification of multiple HDT has increased due to the recent introduction of HRMN techniques. Wood *et al*.[7] reviewed the HRMN studies of the thoracic spines of 90 asymptomatic volunteers. At least one disc was herniated in 33 (37%) of the 90 volunteers, and 13 (39%) of the 33 individuals who had at least one hernia had multiple hernias. In our study, 57.58% of the patients had multiple hernias. This higher rate than in the study by Wood *et al*. may be due to our inclusion of medium-sized and small hernias. As reported previously,[10,11,15] smaller hernias are also capable of generating important symptoms.

Conventionally, HDT symptoms have rarely been observed because, in most cases, only neurological symptoms were taken into account. However, HDT can cause inflammatory affectation of the nerve root and posterior cords, thus giving rise to severe chest or abdominal discomfort.[16-19] In consequence, many of these patients present (as reported previously)[15] a prolonged clinical situation, with pain in the back (90%), abdomen (77%), or other locations (pubis 43%, genital area 35%, and lower extremities, 66%), always at a considerable level of intensity and frequently accompanied by urological digestive symptoms (95%). These symptoms cause a significant deterioration in the gastrointestinal quality of life and lead patients to be offered a large number of complementary tests, consultations with specialists, and even hospital admission. However, after all these studies, the condition of the patients is generally summarized as

being of a functional nature, and so the treatment provided is inadequate and the results obtained, unsatisfactory. Therefore, it is very important to determine the anatomy and frequency of the different locations of these hernias to understand the physiopathology of the condition produced.

HDT has been described as occurring more frequently in middle-aged and older patients, with no differences by gender.[1,2] However, in the present study, we observed a greater presence in males, who also suffered a higher number of lesions in each case. Only among patients aged under 35 years were the number of hernias greater among women than among men. Arce and Dohrmann[20] reported that 75% of HDT occurred below T8, 3% between T1 and T2, and <1% between T2 and T3. In our case, 75% of the cases of TDP were below T7. We concur with Love *et al*.[21] that the central area of the disc is the most frequently affected, and thus, the main involvement of HDT is in the visceral and somatic afferent fibers of the spinal column.

A striking finding in our study is that the majority of hernias or protrusions obliterate the canal. In contrast, they make contact with nerve structures much less frequently and hardly ever damage it. However, in our previous study, these patients presented important symptoms, suggesting that even if an HDT does not compress the nerve structures directly, they may be affected by the release of chemical substances.

In summary, we conclude that HDT is more frequent than was classically thought that they are encountered most frequently from level T6 and are also most frequent in a central location. They affect men more than women (1.36/1), they tend to obliterate the nerve structures but less frequently come into contact with the nerves and very rarely damage them. Therefore, the symptoms observed in most cases are probably provoked by the release of irritant enzymes and not by direct compression.

REFERENCES

1. Le Roux PD, Haglund MM, Harris AB. Thoracic disc disease: Experience with the transpedicular approach in twenty consecutive patients. Neurosurgery 1993;33:58-66.
2. Uribe JS, Smith WD, Pimenta L, Härtl R, Dakwar E, Modhia UM, *et al.* Minimally invasive lateral approach for symptomatic thoracic disc herniation: Initial multicenter clinical experience. J Neurosurg Spine 2012;16:264-79.
3. Arce CA, Dohrmann GJ. Herniated thoracic disks. Neurol Clin 1985;3:383-92.
4. Awwad EE, Martin DS, Smith KR Jr., Baker BK. Asymptomatic versus symptomatic herniated thoracic discs: Their frequency and characteristics as detected by computed tomography after myelography. Neurosurgery 1991;28:180-6.
5. Gille O, Soderlund C, Razafimahandri HJ, Mangione P, Vital JM. Analysis of hard thoracic herniated discs: Review of 18 cases operated by thoracoscopy. Eur Spine J 2006;15:537-42.
6. Williams MP, Cherryman GR. Thoracic disk herniation: MR imaging. Radiology 1988;167:874-5.
7. Wood KB, Garvey TA, Gundry C, Heithoff KB. Magnetic resonance imaging of the thoracic spine. Evaluation of asymptomatic individuals. J Bone Joint Surg Am 1995;77:1631-8.
8. Pinto Rafael JI, Carda R, Sanz F, Izquierdo JM, Vázquez-Barquero A, Trigueros F, *et al*. Transthoracic transpleural approach for thoracic disc herniation. A study of nine cases. Neurocirugía 1999;10:136-42.
9. Srinivasan R, Greenbaum DS. Chronic abdominal wall pain: A frequently overlooked problem. Practical approach to diagnosis and management. Am J Gastroenterol 2002;97:824-30.
10. Lara FJ, Berges AF, Quesada JQ, Ramiro JA, Toledo RB, Muñoz HO, *et al.* Thoracic disk herniation, a not infrequent cause of chronic abdominal pain. Int Surg 2012;97:27-33.
11. Pérez Lara FJ, Hernández Carmona J, Quintero Quesada J, Moreno Ramiro JA, Bustamante Toledo R, del Rey Moreno A, *et al*. Chronic abdominal pain secondary to thoracic disc hernia: A cross sectional study of 46 patients. Research 2014;1:866.
12. Middleton GS, Teacher JH. Injury of the spinal cord due to rupture of an intervertebral disc during muscular effort. Glasgow Med J 1911;76:1-6.
13. Key CA. On paraplegia depending on disease of the ligaments of the spine. Guys Hosp Rep 1838;3:17-34.
14. Bransford R, Zhang F, Bellabarba C, Konodi M, Chapman JR. Early experience treating thoracic disc herniations using a modified transfacet pedicle-sparing decompression and fusion. J Neurosurg Spine 2010;12:221-31.
15. Lara FJ, Quesada JQ, Ramiro JA, Toledo RB, Del Rey Moreno A, Muñoz HO, *et al.* Chronic abdominal syndrome due to nervous compression. Study of 100 cases and proposed diagnostic-therapeutic algorithm. J Gastrointest Surg 2015;19:1059-71.
16. Stetkarova I, Chrobok J, Ehler E, Kofler M. Segmental abdominal wall paresis caused by lateral low thoracic disc herniation. Spine (Phila Pa 1976) 2007;32:E635-9.
17. Bartolomei L, Carbonin C, Cagnin G, Toso V. Unilateral swelling of the lower abdominal wall. Unusual clinical manifestation of an upper lumbar disc herniation. Acta Neurochir (Wien) 1992;117:78-9.
18. Cho HL, Lee SH, Kim JS. Thoracic disk herniation manifesting as sciatica-like pain – two case reports. Neurol Med Chir (Tokyo) 2011;51:67-71.
19. Lyu RK, Chang HS, Tang LM, Chen ST. Thoracic disc herniation mimicking acute lumbar disc disease. Spine (Phila Pa 1976) 1999;24:416-8.
20. Arce CA, Dohrmann GJ. Thoracic disc herniation. Improved diagnosis with computed tomographic scanning and a review of the literature. Surg Neurol 1985;23:356-61.
21. Love JG, Schorn VG. Thoracic-disk protrusions. JAMA 1965;191:627-31.

How to cite this article: Lara FJP, Parrilla MV, Berges AF, Gonzalez JMH, Reyes HOL. Anatomical Descriptive Study of 337 Thoracic Disc Herniations. Clin J Surg 2019;2(1)1-5.