

Thoracic Disk Herniation, a not Infrequent Cause of Chronic Abdominal Pain

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This study assesses the proportion of patients presenting with nonvisceral chronic abdominal pain who have thoracic disk herniation as a possible cause. We designed a descriptive transversal study of patients attending our offices between February 2009 and October 2010, with a complaint of chronic abdominal pain of suspected abdominal wall source (positive Carnett sign). Nuclear magnetic resonance (NMR) of the spinal column was performed on all patients. When the NMR showed thoracic disk herniation the patients were treated according to their etiology. We also evaluated the symptoms in patients with thoracic disk herniation and their response to the applied treatment. Twenty-seven patients with chronic abdominal pain were evaluated. The NMR results in 18 of these 27 patients (66.66%) showed evidence of disk herniation. We report on the results of these 18 patients, emphasizing that the symptoms are florid and varied. Many patients had been previously diagnosed with irritable bowel syndrome. Thoracic disk herniation may account for chronic abdominal pain in many patients who remain undiagnosed or are diagnosed with irritable bowel syndrome. Thus, this possibility needs to be taken into account to achieve a correct diagnosis and a suitable mode of treatment.

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Chronic abdominal wall pain is often misinterpreted as arising from a visceral source, frequently leading to inappropriate diagnostic tests, unsatisfactory treatments, and considerable cost. Its prevalence in the general medical practice is unknown. Some investigators estimate it in about 10% of patients with chronic idiopathic abdominal pain who attend gastroenterological practices.¹ The most common cause is entrapment of an anterior branch of one or more thoracic intercostal nerves²; myofascial pain and radiculopathy (e.g., diabetic radiculopathy) are less frequent.³ Early exclusion of a parietal source could increase diagnostic accuracy when evaluating patients with chronic abdominal pain.

Thoracic disk herniation accounts for less than 1% of all disk protrusions.⁴ Arce and Dhormann⁵ reported that 75% of cases occurred below T8, whereas 3% of cases occurred between T1 and T2, and less than 1% occurred between T2 and T3. Disk degeneration is the main causing factor. Trauma is also considered to be a major factor. Up to 25% of patients have been found to report a history of trauma.

A review of the related literature indicated that most cases of thoracic disk herniation were associated to mild-to-moderate clinical presentations involving sensorial complaints (abdominal wall pain) or pseudovisceral complaints of digestive, gynecologic, or urologic nature. Thus, the specialist to which such patients are often referred to (usually gastroenterologists, digestive surgeons, urologists, or gynecologists) hardly suspect the true etiology of this clinical picture. On this basis, we developed a study with the objective of estimating the actual prevalence of thoracic disk herniation as a cause of chronic abdominal wall pain. We postulate that its frequency is higher than that described at present, and that the fact that it is seldom suspected impairs its diagnosis. We further described the symptoms associated with this condition with the aim of contributing to improve the diagnosis.

Materials and Methods

We conducted a descriptive transversal study designed to assess the prevalence of thoracic disk herniation as a cause of chronic abdominal pain, and to describe its associated symptoms. We included all patients visiting the outpatient department between February 2009 and October 2010 with a complaint of chronic abdominal pain of suspected abdominal wall source. They had undergone tests to rule out visceral

organic conditions. We included only patients presenting with a positive Carnett sign.⁶ Assessment of this sign involves identifying the most painful abdominal area upon palpation with the patient in the supine position, then asking the patient to lift the head and shoulders from the examination table to tense the abdominal muscles and again pressing on the most painful area. If the pain increases (or remains unchanged) a positive Carnett sign is obtained and the likelihood of an abdominal wall source of pain is higher. Conversely, tensing the abdominal muscles protects the abdominal cavity from pressure, therefore the visceral pain decreases upon palpation. Patients with a positive Carnett sign gave their informed consent before their inclusion in the study. A nuclear magnetic resonance (NMR) study of thoracic spine (C7 to T1 and T12 to L1) was requested for all patients.

Patients with thoracic disk herniation were sequentially treated for symptom control with nonsteroidal anti-inflammatory drugs administration plus physiotherapy. If there was no response to the treatment, a short-term corticoid therapy was established, and finally, if symptoms still persisted patients were treated with gabapentin. Local anesthetic patches were also used in patients with painful nerve endings.

Patients were asked to complete a questionnaire (Table 1) designed to evaluate sex, age, abdominal pain (location, frequency, and possible association with effort), history of trauma, urinary symptoms (dysuria), respiratory symptoms (pain with deep inspiration), digestive symptoms (meteorism or changes in bowel movement), occurrence and location of extra-abdominal pain, paresthesia, specialists they had been referred to, complementary tests requested, surgical interventions because of pain, and duration of the clinical picture.

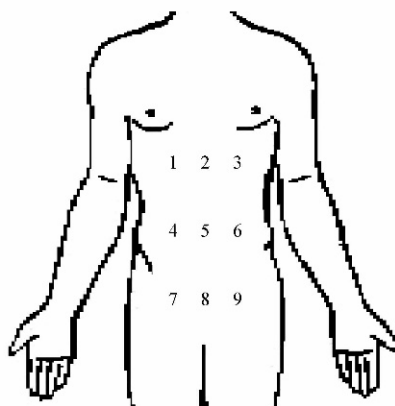
Results

We included 27 patients (59.26% women; 40.74% men) with clinical signs of abdominal wall pain. Their average age was 55.48 ± 14 years (range, 28–82 years). The NMR results from 18 of these 27 patients (66.66%) showed evidence of disk herniation between C7 to T1 and T12 to L1 (Fig. 1), with the highest frequency between T7 and T10 (Fig. 2). Patients in this group (66.11% women and 38.89% men; mean age 54.22 ± 16 years, range 28–82 years) had a total of 28 herniated disks (1 to 4 herniated disks per patient). Most of the herniated disks were

Table 1 Evaluation test for patients presenting with thoracic disk herniation

Please answer the following questions on the symptoms you have been experiencing since you are affected by the condition currently under study:

- 1- Do you experience abdominal pain? If so, please mark the pain location on the picture below and answer to questions 2, 3, 4 and 5.



- 2- How often do you experience abdominal pain?
 3- Is there any connection between this pain and physical effort?
 4- Was the onset of this pain associated with any kind of trauma? If so, indicate the location.
 5- Was the onset of this pain associated with any postural strain (e.g. leaning forward for a long time)?
 6- Do you experience any discomfort while urinating? (If so, please describe it.)
 7- Do you experience or have experienced increased bowel sounds and/or flatulence?
 8- Do you experience or have experienced diarrhea, constipation or altered bowel movement? (If so, please indicate the alteration.)
 9- Do you experience or have experienced difficulty breathing in connection with this pain?
 10- Do you experience or have experienced back pain?
 11- Do you experience or have experienced groin pain?
 12- Do you experience or have experienced pain in a leg?
 13- Do you experience or have experienced pain in genitalia?
 14- Do you experience or have experienced pain in a leg?
 15- Do you experience or have experienced tingling? (If so, please indicate on what location.)
 16- What investigations have you undergone because of this pain?
 17- What specialists have you visited because of this pain?
 18- How long have you had abdominal pain?
 19- What treatment have you been on, after diagnosis?
 20- What changes have you noticed after the treatment?
 21- Have you undergone any surgical procedure because of this pain? (If so, please indicate the operation.)
 22- If you experience any symptoms not mentioned in this questionnaire, please describe it briefly.



Fig. 1 Dorsal disk hernia at level T11 to T12.

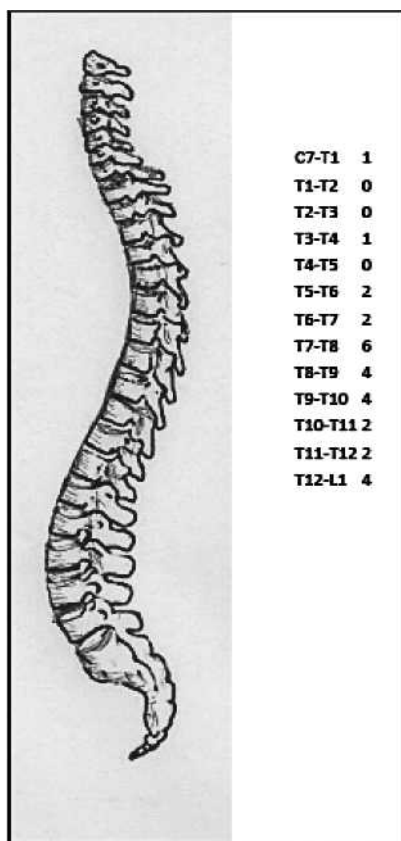


Fig. 2 Location of disk herniations.

in central locations (64.29%), followed in decreasing order of frequency, by right paracentral (21.43%) and left paracentral (14.28%) locations. All herniations partially obliterated the anterior subarachnoid space, with radicular involvement recorded only in 2 patients (11.11%). All of these patients reported continuous abdominal pain: 83.33% of them on a daily basis and the remaining patients, from 1 to 3 times a week. Fifteen patients (83.3%) reported that the pain got worse with effort, whereas 27.77% reported a history of trauma. Figure 3 shows the pain distribution areas. Pain involved the flanks more frequently than the central abdomen; 72.22% of patients reported that abdominal pain was exacerbated in a certain position (kyphosis) and 61.11% reported pain with respiration. Pain in other locations was also reported as follows (Table 2): 88.88% of patients reported back pain, 72.22% reported inguinal pain, 44.44% reported pain in a lower limb, and 44.44% reported pain in the genital area. Digestive clinical signs were present in 50% of patients and urologic signs also in 50% of them. Paresthesia at a certain point in the evolution of their condition was reported by 61.11% of the patients,

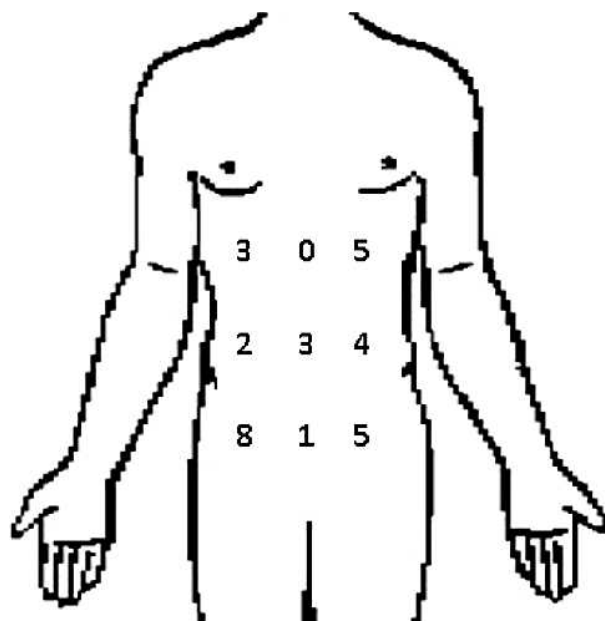


Fig. 3 Frequency of pain location sites as reported by patients.

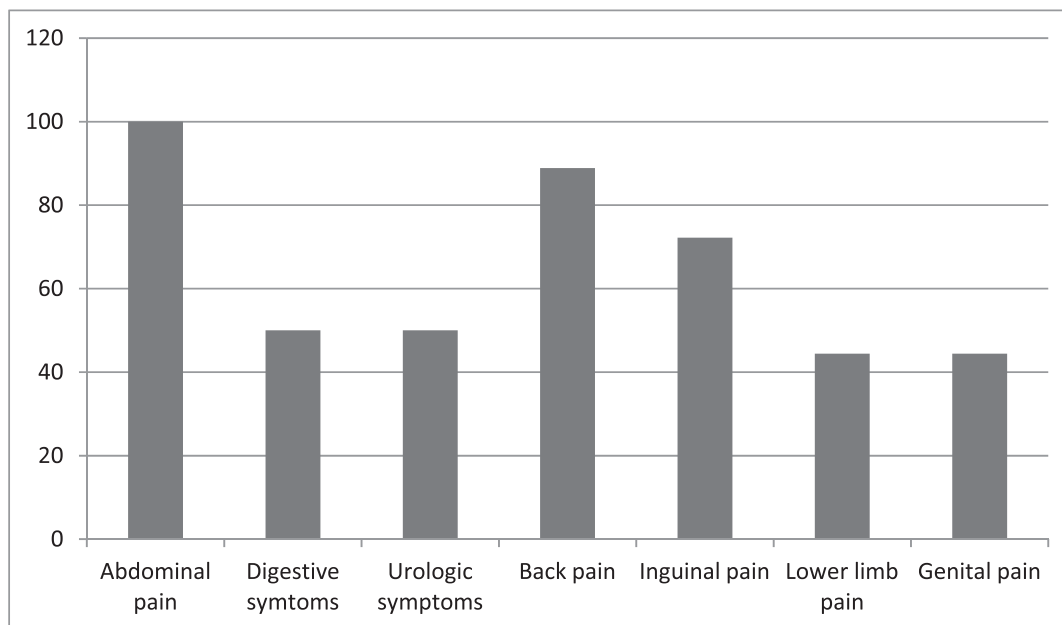
depending on the location of the herniation. These patients had been referred to a mean of 3.16 specialists (range, 2–5), who had requested a mean of 4.11 complementary tests (range, 2–7) in the assessment of pain. The mean time elapsed since detection of the initial symptoms until diagnosis was 46.22 months (range, 3–240 months). Three of these patients (16.66%) had undergone surgical interventions because of different suspected etiologies (oophorectomy, adrenalectomy, and umbilical hernia repair). Finally, a remarkable 66.66% of the patients with thoracic disk herniation had been previously diagnosed with irritable bowel syndrome.

When asked how they were feeling after therapy, 61.11% of them reported remarkable improvement, 22.22% reported moderate improvement, and 16.66% reported slight improvement. None of these patients reported no improvement or worsening of the symptoms after treatment.

Discussion

An abdominal wall source can be found in 30% of cases of chronic abdominal pain.⁷ Cyriax was the first one to describe abdominal pain of nonvisceral origin and to postulate that nonvisceral abdominal pain could affect many patients.⁸ However, the English obstetrician John B. Carnett⁶ was the first one to attribute abdominal pain to the abdominal wall structures and to describe, in 1926, the clinical sign—still used in patient examination—which was named after him.

Table 2 Symptoms of patients with thoracic disk herniation



In addition to dramatically deteriorating the patient's quality of life, chronic abdominal pain may increase health-related costs as well as the risk of subjecting the patient to unnecessary diagnostic tests or even to unnecessary interventions for suspected visceral causes, thus increasing the demand for medical resources.⁶ Many of these patients are eventually referred to pain therapy centers for treatment of their symptoms. Women are more often affected than men (4:1), with a peak incidence in both sexes between 30 and 50 years of age, although it may also affect children and elders.⁹⁻¹¹

The abdominal wall source of pain includes all conditions that involve the structures of the abdominal wall: skin, parietal peritoneum, subcutaneous cell tissue, aponeurosis, abdominal muscle groups, and somatosensory innervations from nerve roots T7 to T12. In the latter case, both the sympathetic visceral fibers and the nociceptive somatic afferent fibers converge in the same thoracic root,¹² therefore the pain arising from the spinal muscles or the vertebral body may be misinterpreted as of visceral origin.

The picture may be further complicated if a herniated disk directly compresses a spinal root or the ascendant sensory bundles in the spinal cord, thus producing sensory alterations that could involve the innervations—areas of several roots or produce bilateral symptoms¹³ (this would account for our findings of patients with lesions higher than the T7 level, who present with abdominal pain).

In a study by Constanza *et al*¹⁴ only 4% of surveyed doctors in charge of patients with chronic abdominal pain had considered an abdominal wall source in their initial diagnosis. In a review by Gray and Collin,¹⁵ 43% of patients with abdominal pain remained undiagnosed after completion of the tests.

The fact that the specialists (*e.g.*, gastroenterologists, digestive surgeons, urologists, gynecologists) initially address visceral conditions as the cause of chronic abdominal pain indicates that they are not familiar with possible anterior abdominal wall causes.

Maigne¹⁶ described the abdominal wall-related causes of chronic abdominal pain, which he named thoracolumbar junction syndrome. It consists of an usually minor painful intervertebral dysfunction (most frequent in T11 to T12 or T12 to L1), although according to Maigne, disk herniation or another severe condition (*e.g.*, myeloma, metastasis) may occasionally be involved. Thus, the symptoms described by Maigne apply to thoracic disk herniation, which may result in pseudovisceral abdominal pain, and diverse symptoms produced by abdominal wall pain (digestive, urologic, gynecologic, motor or sensory symptoms) that often results in a more complicated and delayed diagnosis. Galtier *et al*¹⁷ presented a 6-case series where the time to diagnosis varied between 3 days and 2 years.

On this basis, we speculate that diagnosed cases might be only a small proportion of the actual number of cases as a definitive diagnosis is often not reached. In our study, the mean time to diagnosis

was 46.22 months (3–240 months), which was probably reduced by the fact that these patients were recruited for this study.

Persistent pain leads physicians to request a number of tests, arduous investigations,¹⁸ where incidental findings of minor abnormalities often lead to unnecessary surgery, especially in the gynecologic field.

In the related literature, thoracic disk herniation appears to be rare. This is probably because the rib cage provides support and partially relieves the load on thoracic intervertebral disks. Because in physiologic kyphosis, the extradural space is reduced, the spinal cord is closely adjacent to the back of vertebral bodies and disk spaces, thus minimal disk protrusions may produce severe neurologic disorders. Furthermore, the stabilization of the spinal cord by denticulate ligaments and the sudden nature of disk compression impair the adaptation of the spinal cord.

The accuracy of image diagnosis determinations (NMR) improves detection of thoracic disk anomalies. Thus, suspecting disk-related etiology of abdominal pain remains the essential point. Simple and apparently reproducible criteria to diagnose chronic abdominal wall pain have been published¹⁹:

1. Patient reporting highly localized pain.
2. Fulfillment of any of the following criteria: fixed location of sensitivity or superficial sensitivity; diameter of the sensitive site no larger than 2.5 cm; or positive Carnett sign.

These criteria were found to have 85% sensitivity and 97% specificity.

In 1926, John Carnett⁶ described intercostal neuralgia as a cause of chronic abdominal pain, which he diagnosed on the basis of a positive response to the sign that was named after him.^{7,20}

Gray *et al*²¹ published a case series of 158 patients with positive Carnett sign who underwent exploratory surgery with results of visceral causes (appendicitis) in only 5 of them (3.16%). This sign is, however, not useful in patients of extreme ages or in patients with generalized abdominal pain or signs of peritoneal reaction.

Its simplicity, easy application, and usefulness in terms of clinical information lead to the qualification of the Carnett sign as “one of the most cost-effective procedures in gastroenterology” when reducing unnecessary costs was being considered.²²

An algorithm for assessing chronic abdominal pain, based on the Carnett sign and infiltration on the trigger points, has been proposed by Gallegos and Hobsley²³ and applied by Greenbaum *et al*.²⁰

In our study, 66.66% of patients with a positive Carnett sign had thoracic disk herniation between levels C7 to T1 and T12 to L1. Many of the remaining patients are likely to have a condition affecting other levels of the abdominal wall (e.g., anterior nerve entrapment, diabetic or inflammatory radiculopathy) given the high sensitivity and specificity of the positive Carnett sign.

Therefore we propose that gastroenterologists should routinely include assessment of the Carnett sign, and anesthetic infiltration of the trigger points if necessary, when a diagnosis for chronic abdominal wall pain is being considered.^{24,25}

No evidence-based treatment for patients with chronic abdominal wall pain is currently available. Infiltrations with anesthetics, corticoids, or botulinum toxin on the corresponding metameric nerves have been tried. In cases where 3 consecutive infiltrations fail to relieve pain, surgery may be indicated.

Surgery may be also useful in some patients, to dissect certain nerves or to release those that could be entrapped in surgical sutures.^{26,27} In case of thoracic disk herniation, surgical intervention entails a considerable risk of paraplegia, thus it is only indicated in severe pain cases.

No patient in our study had severe symptoms or neurologic involvement, thus all of them underwent the treatment described in the “Results” section. In 61.11% of cases, symptoms were completely controlled. In the remaining patients symptoms were partially controlled. It has to be taken into account that chronic symptoms with acute episodes are involved—much like with lumbar sciatica—and therefore chronic and intermittent treatment is needed in accordance with the symptoms.

In conclusion, the usual procedure currently followed with patients presenting with chronic abdominal pain consists of checking for a visceral source by means of complementary tests. If such investigations fail to show evidence of a visceral cause of pain, the patient is usually labeled as suffering from psychosomatic or functional pain.^{28,29} Reaching a correct diagnosis and an effective treatment for patients with chronic abdominal pain of unknown etiology may be frustrating both for the physician and the patient.³⁰ However, performing a careful evaluation of patient’s background, considering thoracic disk herniation (given the high percentage we found in our study), and emphasizing the assessment of symptoms and corresponding examinations—including the useful Carnett sign—may lead the physician to a correct diagnosis. In this way, although screening for visceral disease³¹ would still be necessary, a number of expensive investigations could be saved

and designing suitable treatments would be easier. Furthermore, knowing the source of pain could help improve the patient's psychologic aspects and mood.

Finally, we emphasize our finding that 12 of 18 patients with chronic abdominal pain, who we diagnosed with thoracic disk herniation, had been previously diagnosed with "irritable bowel syndrome." We believe that this finding opens a new field, where the percentage of patients diagnosed with irritable bowel syndrome who have symptoms of abdominal wall pain, could have thoracic disk herniation as a possible cause.

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