CLINICAL NOTE

Spinal cord compression in the emergency department: using a diagnostic-therapeutic algorithm

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Malignant spinal cord compression is a medical emergency. Along with superior vena cava compression syndrome, spinal cord compression numbers among the most common oncologic emergencies. Delay in diagnosis or treatment can lead to greater or lesser degrees of paralysis or sphincter sensory alterations or loss of control in a very high percentage of patients, leading to considerable deterioration in quality of life. Early diagnosis followed by appropriate treatment of symptoms are the factors that most improve prognosis. [Emergencias 2010;22:120-124]

Key words: Spinal cord compression. Early diagnosis. Radiotherapy.

Introduction

Spinal cord compression (SCC) syndrome is a serious complication that occurs in 5-10% of cancer patients. Incidence varies with type of tumor: prostate, breast and lung cancer represent 45-60% of all SCC, multiple myeloma and lymphoma 5-10% of SCC, and less frequently other tumors that spread to bone during evolution. Between 8 and 30% of SCC is the first manifestation of cancer, especially in tumors of unknown origin, multiple myeloma, lymphoma or lung cancer[1-9].

SCC is a medical emergency and represents a paradigm of oncologic emergencies. Delay in diagnosis and treatment can lead to the onset of paralysis, impaired sensation and / or loss of sphincter control in a very high percentage of patients[3,7-11]. We present a case report and review of the concept of SCC secondary to metastasis to the spine, its pathogenesis, clinical features, diagnosis and treatment, and we propose an algorithm for action in the ED in cases of suspected SCC.

Case report

This was a 61 year-old man with a 3-year history of stage T3N0M0 prostate adenocarcinoma, treated with radiation and hormonal blocking, without local or distant recurrence in the previous six months. He attended the ED with lumbar back pain of 2 months evolution and loss of motor strength in the right leg. He referred left dorsolumbar pain without nervous irradiation, worsened by sitting and supine positions and lessened by standing and partially responsive to NSAIDs. He reported no paresthesia, dysesthesia or sphincter disorder. Physical examination showed decreased right leg motor strength (III / V) without alterations in sensitivity, tendon reflexes or sole reflex. Complementary examinations (Complete laboratory test and X-ray of the chest and the dorsolumbar spine) were normal. Magnetic resonance imaging (MRI) of thoracolumbar spine showed bone metastases in the body and posterior arch of D-10 causing spinal canal stenosis and spinal cord compression (Figure 1).

Figure 1. MRI showing metastatic destruction of the vertebral body D10 with protrusion of the posterior wall towards the spinal canal.

With a diagnosis of SCC, treatment was started with dexamethasone 10 mg initial bolus and then 4 mg every 6 hours, together with a proton pump inhibitor and level 3 analgesic with transdermal fentanyl patches at a dose of 25 mcg/h/72 h. Emergency radiation was initiated on a segment of the spine between D-8 and D-12, and the patient was prescribed 10 fractions of 300 cGy daily. The outcome was favourable, with improvement in pain and walking. Once radiotherapy terminated, the patient was discharged with tapered oral corticosteroids and without important neurological sequelae.

Discussion

ESCC is a medical emergency that requires correct diagnosis and treatment in the shortest time possible. The guidelines recommend initiating treatment in the first 24-36 hours after diagnosis[12]. Over two thirds of patients with established but untreated SCC evolve to paraplegia in 7-10 days[7,8]. Survival on average varies between 3 and 6 months and two most important factors related to survival are the etiology of the primary tumor and the degree of neurological involvement present on initiating treatment[3,7-11]. SCC secondary to breast cancer is associated with the highest survival rates, and SCC secondary to lung cancer has the worst prognosis[5,13,14].

The most common cause of SCC is the existence of one or more metastases of epidural location which compress the thecal sac and its contents, although 10-15% of SCC are due to the presence of paraveretebral tumor that extends through the foramina without bone being necessarily involved, as in lymphomas, neuroblastomas and childhood sarcomas or Pancoast tumors of the lung. SCC caused by the presence of intramedullary, intradural or leptomeningeal metastasis is less frequent and represents only 3% of the total[13].

SCC affects the spine in 60-80% of cases, due to both physiological kyphosis which favors compression and to the fact that the spinal cord at this level virtually fills the spinal canal. In 15-30% of cases it is found on the lumbar spine and less than 10% of the time it exclusively affects the cervical spine. More than half the patients at diagnosis present simultaneous involvement of more than one spinal area[3,9-11,13].

The clinical picture of SCC is easily recognizable. Localized pain in the back usually precedes the onset of motor symptoms or sensory disturbance and loss of sphincter control. Intensity is constant and progressive in virtually all patients, and over 80% of them claim to have suffered persistent pain during 6-8 weeks prior to diagnosis which increased after prolonged lying or Valsalva maneuvers[2,3].

Motor alterations are the second most frequent symptom. Between 60-85% of patients show some degree of loss of motor strength, and show anything from a minimum degree of paresis

to complete paralysis; two thirds of patients are unable to walk at diagnosis. Motor symptoms are more common when SCC affects the thoracic spine[6-11,13]. Sensory alterations in the form of paresthesia, hypoesthesia, hyper-or hyporeflexia, clonus or existence of cutaneous-plantar flexor reflex (positive Babinsky sign) are less common than motor disorders, although they are detected to a greater or lesser extent in 40-90% of patients at diagnosis. Clinical sensory level is usually manifest 1-2 segments below the anatomic level of the spinal cord compression due to the arrangement of the sensory fibers in the spinal cord[13]. Sphincter alterations appear later in SCC, and correspond in its intensity with the degree of sensory-motor impairment. However, given the late diagnosis in most cases of SCC, about 50% of patients require a urinary catheter[14].

Clinical suspicion of SCC must be confirmed by imaging studies. MRI, with a sensitivity, specificity and diagnostic accuracy of 93%, 97% and 95% respectively and a diagnostic accuracy of 95% for SCC, is the diagnostic test of choice. Moreover, it allows differentiating between benign causes and tumors, with a sensitivity of 98%,a specificity of 100% and diagnostic accuracy of 98%[15]. MRI must be urgently required and completed in all symptomatic patients with SCC of suspected tumoral origin when these patients have current or past cancer[11,13,16]. Computed tomography (CT) is also sufficiently sensitive to assess bone involvement; it facilitates the performance of diagnostic puncture and is useful for planning surgical procedures[10]. Conventional plain X-ray results in 10-17% false negatives while myelography is increasingly less used due to associated iatrogenic risks[3,11]. Other imaging methods such as bone scan or positron emission tomography show lower diagnostic performance for SCC than MRI[3,10,11].

Once diagnosed, treatment is determined by the patient's condition and the clinical course of the picture or the presence of comorbidities, but fundamentally by the need for histological confirmation of the origin of the disease. Treatment objectives are pain relief, maintenance or recovery of neurological function and maintenance of spinal stability. Patients with clinical and radiological diagnosis of tumor-derived SCC should initiate, urgently and immediately, clinical treatment with corticosteroids, and after radiologic confirmation must be referred urgently to a radiation oncology service for evaluation.

The use of corticosteroids in patients with SCC is backed by type 1 clinical evidence. The mechanism of action is based on both the reduction of edema and inhibition of inflammatory response or stabilization of vascular membranes[3,10]. Although several studies have demonstrated the effectiveness of corticosteroids in the treatment of SCC, the optimal doses to be used at the start and for maintenance are not clearly established. Only one randomized study analyzed effectiveness of using high initial doses of dexamethasone (100 mg i.v.) versus moderate doses (10 mg i.v.). After the initial dose, both groups of patients received a maintenance dose of 16 mg/24 hours. Both study arms showed pain reduction with significant differences with respect to dose. Although the study sample was small (37 patients), the authors concluded that, given these results, moderate doses of dexamethasone should be used[17]. Therefore, given the lack of consistent evidence in favor of high dose dexamethasone, initial doses of 10-100 mg followed by maintenance doses of 16-96 mg / day are probably appropriate in the context of SCC[11,16,17,18].

Radiotherapy is the standard treatment for most patients with oncologic SCC. Its effect is attributed to the reduction of vasogenic edema and tumor mass together with that mediated by the release of cytokines with anti-inflammatory effect, mainly prostaglandin E. Radiation therapy in SCC provides full or partial pain relief in 70-85% of patients, as well as preservation or improvement of walking ability in 80-100%, 45-60% and 4-11% of patients who initiate treatment with ambulatory status, or paretic status or already established paraplegia, respectively[4,5,14].

The most common treatment regime is the administration of 3000 cGy in 10 fractions of 300 cGy daily for 2 weeks. In certain circumstances, depending on the patient's general condition, their ability to commute to the treatment center and disease prognosis, other radio-therapeutic regimes have been used: 800 cGy in a single session, 4,000 cGy in 20 fractions or 3750 cGy in 15 fractions. None of these treatment regimens have demonstrated superiority over the others[21-23].

Surgery is the treatment of choice in patients without known history of cancer or when doubts remain about the histo-pathological cause of spinal cord compression. Surgery offers both an immediate solution to the picture by mechanical stabilization of the damaged spine and spinal tissue samples for histological diagnosis. It should also be chosen in the presence of crushed vertebral bone fragments in the spinal canal, marked spinal instability or in the absence of response or symptomatic progression of the patient during the course of radiation therapy[1,3,10,11,13].

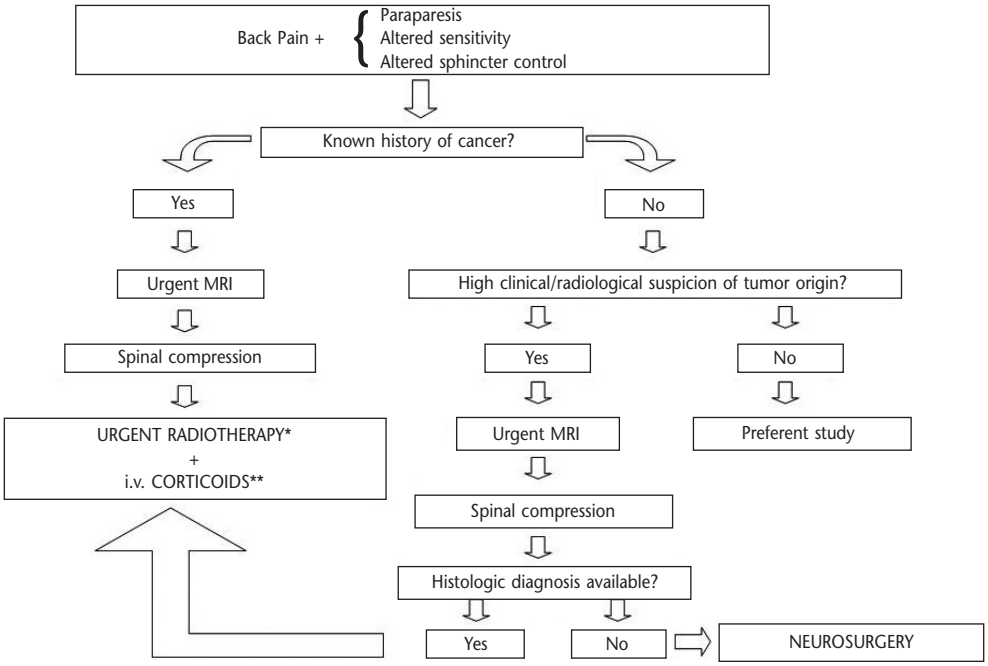

Figure 2. Diagnostic therapeutic algorithm for spinal cord compression syndrome.*Urgent radiotherapy: initiate treatment in the first 24-36 hours after diagnosis. **i.v. Corticosteroids: dexamethasone 10-100 mg bolus followed by 16-96 mg/24h. MRI: Magnetic resonance imaging.

Faced with suspected SCC in the ED, it may be useful to have a simple algorithm such as that proposed in Figure 2, to assist in decision-making for the diagnostic and therapeutic approach. The presence of back pain accompanied at some point by the appearance of muscle weakness, impaired sensitivity or loss of bowel control, should arouse suspicion of SCC. It should be borne in mind that the main factor related to both survival and walking capacity is the neurological state before treatment, so minimal delay in diagnosis and treatment of SCC is crucial for the prognosis of these patients.

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Síndrome de compresión medular en urgencias: utilización de un algoritmo diagnóstico-terapéutico

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El síndrome de compresión medular (SCM) representa una urgencia médica y es, junto con el síndrome compresión de vena cava superior, el paradigma de las urgencias oncológicas. El retraso en su diagnóstico y tratamiento puede conllevar, en mayor o menor grado, la aparición de parálisis, alteraciones de la sensibilidad y/o pérdida del control de los esfínteres en un porcentaje muy alto de los pacientes, lo cual condiciona un empeoramiento notable en la calidad de vida. Un diagnóstico precoz seguido de un tratamiento adecuado del cuadro clínico son los factores que más influyen en el pronóstico del SCM. [Emergencias 2010;22:120-124]

Palabras clave: Compresión medular. Diagnóstico precoz. Radioterapia.

ERRATA

• In the article by Coll-Vinent B et al. published in Emergencias 2010;22:21-7, references 2 and 8 appear incorrectly cited. These should be as follows:

Ref 2. Cabrera A, Jiménez O, Moya M, Tejido R, Nogué R. Situación de la Medicina de Urgencias en las Universidades Españolas. Sociedad Española de Medicina de Urgencias y Emergencias. Secretaría de formación. (Accessed 1 May 2009) Available at: http://www.semes.org/images/stories/pdf/formacion_pregrado.ppt

Ref 8. Montero Pérez J, López Álvaro J. La medicina de Urgencias y Emergencias en otros países. In "Programa docente de la especialidad". Anexo II. (Accessed 1 May 2009). Available at: http://www.semes.org/images/stories/pdf/formacion_formacion_continuada.pdf

• In the article by Pardo Rojas P et al. published in Emergencias 2010;22:74-5, figure 2 erroneously appears upside down. The following shows the figure as it should appear.

Figure 2. Plain X-ray of the abdomen in the lateral decubitus position showing a large hydroaerial level.