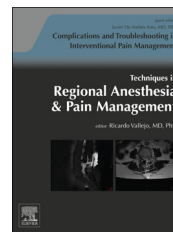


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## Epidural Complications and troubleshooting

Maria Teresa Bovaira-Forner, MD<sup>a,\*</sup>, Javier de Andrés Ares, MD<sup>b</sup>,  
Gisela Roca, MD<sup>c</sup>, Maria Luisa Franco Gay, MD<sup>d</sup>, Consuelo Nieto, MD<sup>e</sup>,  
Paula Bovaira, MD<sup>a</sup>

<sup>a</sup>Department of Anesthesiology, Hospital Intermutual de Levante, Ademúz, Km 11,7, 46184—San Antonio Benagéber, Valencia, Spain

<sup>b</sup>Department of Anesthesiology, Hospital Universitario La Paz, Madrid, Spain

<sup>c</sup>Department of Anesthesiology, Hospital Tries y Pujol, Badalona, Spain

<sup>d</sup>Clinica Vizcaya, Bilbao, Spain

<sup>e</sup>Department of Anesthesiology, Hospital Universitario Fundacion Alcorcon, Madrid, Spain

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### ABSTRACT

Epidural corticosteroid infiltrations are an important option for the treatment of pain, though they are not without complications. The present review was based on a PubMed database search of articles covering the period between 1983 and 2014. The described complications can be grouped into the following categories: (1) *Infections*: The global risk of infections following epidural corticosteroid infiltration is 1%–2%, of which 0.1% prove serious. (2) *Neurologic alterations*: These complications are due to neurotoxicity (arachnoiditis or aseptic meningitis) or intra-arterial puncture and embolization of particulate corticosteroids in vertebral arteries, resulting in spinal or cerebral infarction. (3) *Bleeding*: The principal risk factor for epidural hematoma is primary or pharmacologic coagulopathy. Therefore, the decision to suspend treatment must be made according to the consensus-based clinical guides. (4) *Post-dural puncture headache*: The development of headache in these cases is less frequent than following epidural anesthesia. (5) *Pharmacologic effects of corticosteroids*: Adrenal axis suppression during 3 weeks may be observed. This has been associated with Cushing-like symptoms, mineralocorticoid effects (arterial hypertension), and blood glucose level elevation in diabetic patients. (6) *Others*: There have been reports of diminished bone mass in postmenopausal women and isolated cases of chorioretinopathy and Tachon syndrome. Epidural corticosteroid infiltration performed under radioscopic control and with contrast administration can minimize the risk of complications.

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### Introduction

The first epidural infiltrations for the treatment of pain were performed during the 1950s. The first description of the use of

corticosteroids for the treatment of radicular pain was published by Lievre et al.<sup>1</sup> In 1961, Goebert et al.<sup>2</sup> published a series on 113 patients with lumbar radicular pain who were successfully treated using epidural injection of procaine and hydrocortisone.

\*Corresponding author.

E-mail address: [bovaira@gmail.com](mailto:bovaira@gmail.com) (M. Teresa Bovaira-Forner).

Since then, epidural corticosteroid infiltration has become an increasingly widespread practice,<sup>3</sup> and it presently constitutes an important option for the treatment of pain.

There are 3 access routes to the epidural space: interlaminar (IL), transforaminal (TF), and caudad through the sacral hiatus. The TF approach requires a lesser volume to reach the affected spinal nerve, though systematic reviews have demonstrated no significant superiority of TF epidural infiltration over the IL and caudad routes.<sup>4</sup> In principle, radioscopy appears necessary when using the TF approach, though in recent years, it has become the gold standard for performing the technique—affording greater precision in localizing the needle tip than the traditional guidance methods do (loss of resistance and pendant drop).

The clinical efficacy of the technique is currently subject to controversy. In this regard, although epidural corticosteroids appear to offer at least short-term benefit in well-selected patients, their long-term effects are less clear.<sup>5</sup> In a recent study of 400 patients with lumbar stenosis randomized to 2 treatment groups (200 patients receiving epidural glucocorticoids and lidocaine and 200 patients receiving lidocaine alone), Friedly et al<sup>6</sup> reported similar analgesic effects and functional recovery in both groups. Similar results were obtained by Manchikanti et al<sup>4</sup> in 120 patients administered TF epidural infiltrations of lidocaine with and without betamethasone.

The procedure is not without complications—the patients being exposed to significant morbidity and even isolated cases of mortality. Although the serious complications described in the literature (meningitis, epidural abscess, epidural hematoma, vascular events, or effects inherent to corticosteroid drug use) are fortunately infrequent, it is quite common for patients to develop minor adverse effects, including increased lumbar pain, paresthesias, flushing, or discomfort at the puncture site. The incidence of complications is difficult to establish, with widely varying figures in the literature, although globally it is assumed to be low. In 2 different articles, Botwin et al<sup>7,8</sup> reviewed 322 lumbar and 345 cervical TF infiltrations performed under radioscopy control—the associated incidence of complications being 9.6% and 16.8%, respectively. Another more recent retrospective study analyzed 4265 epidural corticosteroid infiltrations in 1857 patients over a 7-year period, including 161 cervical IL infiltrations, 123 lumbar IL infiltrations, 17 caudad infiltrations, and 3964 lumbar TF infiltrations. There were no major complications. Of the recorded 103 minor complications, representing an infiltration complication rate of 2.4%, the most common problem was increased lumbar pain (1.1%).<sup>9</sup>

## Methods

The present review was based on a PubMed database search of articles covering the period between 1983 and 2014 and using the following key words: epidural, corticosteroids, complications, TF, lumbar, and cervical. Some articles cited in the references of the previously selected publications were also included. The study included reviews, prospective studies with or without randomization, retrospective studies, clinical cases, and case series.

## Results

The true incidence of complications secondary to epidural corticosteroid infiltration for the treatment of pain has not been well established. However, the number of complications is probably underestimated, as many of them are not reported in the literature owing to the possible associated legal consequences. Much of the information on incidents comes from published clinical cases.

The complications described in the literature can be grouped into 6 categories, which have been described in the following sections.

### Infectious complications

According to Goodman et al,<sup>10</sup> the global risk of infections following epidural corticosteroid infiltration is 1%–2%, of which 0.1% prove serious.

Infections following epidural infiltration have been the cause of legal claims in 24 cases reported in the Closed Claim Study<sup>11</sup> and include 12 cases of meningitis, 3 cases of osteomyelitis, 7 epidural abscesses, and 2 cases of disseminated infection. Of the epidural abscesses, 6 were drained and 1 resulted in permanent motor paresis of the lower extremities.

Zimmerman et al<sup>12</sup> evaluated 36 patients with epidural abscesses over a 4-year period. The organism isolated in 4 half of the cases was *Staphylococcus aureus*. The underlying cause was primary hematogenous spread in 16 patients (44%). Among the remaining 20 patients (56%), 4 received previous epidural infiltration and 16 had undergone spinal surgery. The probability of epidural abscess formation attributable to infiltration was therefore 11.1%. These patients often present with concomitant disease conditions, fundamentally diabetes mellitus.

Hooten et al<sup>13</sup> reviewed the reports of epidural abscess secondary to corticosteroid infiltration and identified 14 cases—2 with associated meningitis. In 9 patients, the abscess manifested in the first week after puncture, whereas in 6 cases, it presented after this time. Additionally, 5 of the patients were diabetics. In 8 cases (57%), the blood, cerebrospinal fluid, or epidural pus cultures showed the presence of *Staphylococcus aureus*. Furthermore, 11 patients required laminectomy and surgical drainage, with residual motor dysfunction in 5 cases and 2 deaths.

There have also been other reports of spinal infection such as discitis<sup>14</sup> and osteomyelitis.<sup>5</sup> However, the most alarming infectious incident occurred in 2012 and corresponded with an outbreak of fungal meningitis in the United States, which was associated with a contaminated batch of methylprednisolone acetate that affected 749 patients, with 61 deaths (8%). The mean patient age was 64 years (range: 15–94 years), and 59% of the patients were female. The mean time to onset of symptoms from the last epidural infiltration was 47 days (range: 0–249 days), and *Exserohilum rostratum* was the most frequently isolated organism (20% of the cases). The clinical manifestations consisted of spinal or paraspinal infection in 31% of the patients. Further, 20% of patients presented with only meningitis and 4% with mixed meningitis and spinal

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