Guidelines for the Management of Pyogenic Spinal Infections: A Short Review

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Abstract

Spinal infections are major conditions, capable of posing significant risks to immunosuppressed population. These conditions can lead to potentially disastrous outcome, if timely treatment is not administered. The current article briefly reviews the guidelines in the clinical diagnosis and management of commonly encountered spine infections.

Introduction

Spinal infection was first described by Hippocrates and the management of infection of the vertebral column has greatly evolved over the ages [1]. The common infections involving the vertebral column include spondylodiscitis (infection of intervertebral disc), spondylitis (infection of vertebral body/end plate) and epidural abscess [2,3]. The management of this complex problem is multimodal and includes antibiotics, surgical intervention and supportive treatment [2]. Literature reports suggest that a mean delay of 2-6 months is commonly encountered, which can lead to a catastrophic outcome in certain situations [4,5]. The current article highlights the guidelines in the management of pyogenic spinal infections and reviews the current literature on the same.

Discussion

The diagnosis of pyogenic spinal infections can be difficult and requires a high degree of suspicion [2,4]. Pain is the most common, early presentation (85%), while fever occurs in approximately 50% of patients [6,7]. Neurological deficits, as defined by symptoms including leg weakness, numbness or bladder/bowel incontinence are observed in 33% of patients [8]. The diagnosis is usually based upon the clinical picture, supported by laboratory and imaging findings [2,4].

Spondylitis or Spondylodiscitis

Infections may spread to the vertebral body or disc through hematogenous seeding from a distance focus or a contiguous spread from adjacent tissues [9]. Most infections are monomicrobial, a majority (50%) of which are caused by Staphylococcus aureus [10,11].

Guidelines in the management of Spondylitis or Spondylodiscitis: Laboratory tests can be helpful in identifying spondylodiscitis. Leukocyte cells can be normal or increased. However, Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) are raised in 80% of patients and can serve as reliable indicators to follow the response to treatment [12]. Blood cultures are known to be positive in 50-70% of patients [11]. The confirmatory test is histopathological examination of the infected vertebra or disc space. Nevertheless, in a setting of typical clinical and radiological findings suggestive of infection with a blood culture positive for a likely pathogen, biopsy may not be indicated [13,14].

In most situations, vertebral spondylodiscitis or spondylitis is not a medical emergency and therefore, antimicrobial therapy should not be administered until the microbiological diagnosis is complete with biopsy [13]. The empirical administration of antimicrobial treatment is indicated only in situations of neurological compromise and sepsis [9]. Image (usually Computed Tomography or CT) guided needle biopsy of the affected bone and disc space; and abscess aspiration to obtain aerobic/anaerobic bacterial, fungal and mycobacterial cultures; as well as histopathological examination are recommended [13]. Indications for surgery include neuro-deficits, epidural/paravertebral abscesses, threatened existing cord compression and progression, persistence or recurrence of infection despite antibiotic treatment [9,10].

In case of a negative initial culture despite high clinical suspicion, repeat biopsy is advocated. If the biopsy is still inconclusive, empirical antibiotics may be initiated. However,
a third percutaneous or an open surgical biopsy needs to be planned if there is no objective clinical improvement in 3 to 4 weeks [15]. Another school of thought is to plan an open surgical biopsy after an inconclusive first set of cultures, prior to starting antibiotic treatment [10]. There are no current randomized controlled studies on the ideal pathogen-directed chemotherapy. Nafcillin, oxacillin or cefazolin for methicillin-sensitive Staphylococcus aureus (MSSA), vancomycin for methicillin-resistant Staphylococcus aureus (MRSA), ceftriaxone or penicillin G for Streptococcals species and 3rd- or 4th generation cephalosporins or fluroroquinolones for gram negative bacteria are typically recommended [16].

The empirical antibiotics include a combination of vancomycin with cefotaxime/ ceftazidime/ ceftriaxone/ cefepime or ciprofloxacin. No routine coverage for anerobic organisms is advocated [16]. No routine radiologic follow-up is advised during anti-microbial therapy [17]. Only when the clinical status has not improved despite medical treatment, Magnetic Resonance Imaging (MRI) scan can be obtained to evaluate the need for surgical treatment [17]. MRI scan may be procured 4 to 8 weeks after the completion of treatment [18]. The typical duration of therapy recommended is 6 weeks (parenteral antibiotics), although longer treatment may be indicated in persistent abscesses, drug-resistant organisms and extensive bone destruction [19].

Epidural Abscess

The classic diagnostic triad for epidural abscess includes fever, spinal pain and neuro-deficit, which is typically observed only in a small proportion of patients [20].

Guidelines in the management of Epidural Abscess: Cultures obtained from 90% of abscess 62% of blood and 19% of cerebrospinal fluid (CSF) specimen show positive growth [21]. Two sets of blood cultures and CT guided needle biopsy are obtained in all patients [21]. Two major principles of optimal treatment in epidural abscesses include reduction in size or elimination of the epidural inflammatory mass (surgical drainage) and eradication of the microbe (antimicrobial treatment) [22]. Early surgical decompression and drainage is critical in determining the ultimate prognosis [23]. Indications for surgery include paralysis (within 24 to 36 hours of onset) and significant cord compression on imaging, even in the absence of any neuro-deficit [24].

Immediate administration of antibiotics is recommended after the collection of two sets of blood culture specimens are obtained, whenever the diagnosis of spinal epidural abscess (SEA) is suspected [25]. Although the consensus is heavily in favor of early surgery, there is currently no randomized controlled study comparing the outcome of medical treatment with surgical decompression in SEA [25]. The overall failure rates following conservative (medical-only treatment) approach has been reported to be around 43 to 75% [26]. Medical treatment includes antibiotic therapy under careful supervision, including regular neurological monitoring strategy and follow-up MRI scan [27].

This modality of treatment is only advocated in a small percentage of patients, including those without any known high-risk factors predictive of poor outcome (age more than 65 years, diabetes mellitus, CRP>115 mg/liter, white blood cell count more than 12, 500 cells/ liter; bacteremia and MRSA infection), known organism on culture, no neuro-deficit, medically unstable patients, unacceptable surgical risks and complete spinal cord injury more than 48 hours and lack of evidence of ascending spinal lesion [28]. Even among this highly selected group of “ideal” patients, the risk of failure of isolated medical therapy in SEA is as high as 8.5 to 17 percent [29]. The recommended duration of antimicrobial treatment in SEA is 4 to 8 weeks and first follow-up MRI scan may be obtained after 4 to 6 weeks, if the patient shows satisfactory clinical improvement or at any time whenever a clinical deterioration happens [30]. The prognosis following SEA is guarded, with 5% deaths (due to sepsis) and 4-22% irreversible neuro-deficit reported following treatment [31].

Conclusion

Spinal pyogenic infections are important pathologies, with potentially catastrophic outcome. The need for high alert on part of the spine specialist, early diagnosis, prompt treatment (medical or surgical, as indicated) and regular follow-up cannot be understated, so as to ensure a good recovery.

References


