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Research Article

Current Concepts in the Management of Pyogenic Spondylodiscitis: A Narrative Review

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Abstract

Background: Pyogenic Spondylodiscitis (PS) represents a spectrum of spine disease ranging from septic discitis, vertebral osteomyelitis and spinal epidural abscess (SEA). Though uncommon, it remains an important spine infection in adults which is associated with major morbidity and serious long term sequalae. It is an Orthopaedic emergency that requires prompt and aggressive management.

Objective: The aim of the present review of the literatures is to highlight the current concepts in the management of PS.

Methods: We carried out a comprehensive review of literatures, using key words such as spinal infections, pyogenic spondylodiscitis, vertebral osteomyelitis, spinal epidural abscess, diagnosis, clinical features, investigations, laboratory, imaging, treatment, nonoperative, operative, complications on the search engines of PUBMED, Google Scholar and Scopus in April, 2021. Eligible articles for the review included full length published articles which we have access to contents.

Results: Thirty five full length articles published between 1970 and 2019 were found eligible for the review. The diagnosis of PS is difficult owing to other close differentials including Tubercular Spondylodiscitis (TS). High index of clinical suspicion, laboratory investigations and imaging with contrast enhanced MRI are necessary for prompt diagnosis of PS. Specimens for microbiological assay are necessary for the identification of the causative pathogens. Staphylococcus aureus is the most common pathogen in majority of cases. The main complications of PS are vertebral body destruction, spinal instability, SEA and neurological deficit. The new clinical-radiological classification of PS is a useful tool in decision making concerning appropriate Orthopaedic treatment. Treatment may be non-operative with long-term targeted antibiotic therapy and bracing or surgical decompression and stabilization. Non-operative treatment is successful in majority of cases.

Conclusion: Early diagnosis and treatment of PS is the panacea for good outcome. The major challenges in the management of PS are late diagnosis and presentation with deteriorating neurological deficit.

Keywords: *Pyogenic Spondylodiscitis; Vertebral Osteomyelitis; Spinal Epidural Abscess*

Introduction

Spinal infections are rare Orthopaedic emergencies that require prompt Orthopaedic interventions [1-3]. The spectrum of spinal infections include septic discitis, vertebral osteomyelitis, spinal epidural abscess, spinal meningitis, spinal subdural empyema and spinal cord abscess [1]. The organisms involved in spinal infections include pyogenic, mycobacterial, brucella and fungal pathogens and sometimes parasitic infestations. The aim of this review is to elucidate the current concepts in the management of pyogenic spondylodiscitis.

Pyogenic Spondylodiscitis is potentially a life-threatening infection of intervertebral disc and vertebral bodies in adults [2]. Although rare, the complications of pyogenic spondylodiscitis are life threatening with dismal outcomes [1]. Enhanced MRI and microbiological identification of pathogens are essential for diagnosis [3]. Targeted antibiotic therapy and bracing are the main stay of treatment. Surgery is indicated only in complicated cases [3]. Prompt management of PS is required to obviate the high incidences of complications.

Epidemiology

Pyogenic spondylodiscitis is common among males above fifty years of age with chronic diseases [1,2,4]. A rare condition world-wide in the past and the incidence is not known in developing countries, but observed to be on the increase in developed countries [2].

The annual incidence ranges from 0.4 - 2.4 per 100,000 inhabitants in Europe [2,4,5]. The rising incidence is due to many factors including availability of MRI, increased rates of hospital acquired infections and invasive procedures [1,6]. The mortality rate of upto 11% has been reported [2,7-9].

The Lumbar spine and the anterior part of the spine are affected in majority of cases [1].

Risk factors

The risk factors for pyogenic spondylodiscitis include intravenous drug abuse, diabetes, recent systemic infection, malignancy, immunodeficiency or immunosuppressive medication, obesity, malnutrition, trauma and smoking. These factors predispose to infections and hinder effective functions of both humoral and cellular response to infections.

Classification

Hitherto, there has been no consensus on the classification of PS, however Pola E., *et al*. in 2017 proposed a new clinico-radiological classification to aid decision making on the Orthopaedic treatment of PS [2]. The classification was based on data from 250 patients. The primary criteria for the classification were based on the extent of bone destruction or segmental instability, epidural abscesses and neurological deficits, and the secondary criteria include involvement of paravertebral soft tissue and intramuscular abscesses. Three main classes A, B, and C were based on the primary criteria and subclasses were based on secondary criteria. Uncomplicated PS were treated non-operatively while complicated cases were treated operatively.

Clinical evaluations and contrast-enhanced MRI were used to establish cases of PS including complications. The various types of PS were described as shown in table 1 [2].

Table 1: *The modified new clinical-radiological classification of Pyogenic Spondylodiscitis (PS).*

Type	Based on primary Criteria	Based on secondary Criteria	Treatment guidelines
A	Uncomplicated PS	A_1- Simple PS A_2 - involving intervertebral disc and adjacent bodies A_3 - with limited involvement of paravertebral soft tissues A_4 - with intramuscular abscesses ($_{4.1}$ unilateral / $_{4.2}$ bilateral)	Nonoperative ± percutaneous posterior stabilization
B	Complicated PS with destructive vertebral body	B_1 - PS with stable segment B_2 - PS with paravertebral abscess and stable segment B_3 - PS with unstable segment and kyphosis ($_{3.1}$ kyphosis < 25º and 3.2 kyphosis > 25º)	B_{1and2} - nonoperative ± percutaneous posterior stabilization B_3 - Operative
C	Complicated PS with SEA and neurological deficit	C_1 - PS with SEA C_2 - PS with SEA and instability C_3 - PS with SEA and neurological deficit C_4 - PS with SEA, neurological deficit and instability	C_1 - nonoperative C_{2-4} - Operative

In spite of the new classification methods for PS the debate on the general acceptable classification with optimal treatment guidelines continues [2,10,11].

Other attempts at the classification of pyogenic spondylodiscitis include [3]:

1. Classification according to the onset of disease, this has three types:

    a. Acute types, b) Subacute types and c) Insideous types.

    The onset classification has little value in planning and decision making concerning orthopaedic treatment of pyogenic spondylodiscitis but useful in declaring emergency and increasing the index of clinical suspicions and diagnosis.

2. Radiological classification based on the plain x-ray findings of bone destruction, has three stages:

    a. early stage characterised by narrowing of the disc space;

    b. destructive stage with bone destruction, collapse of softened vertebra and proliferation; and

    c. Osteosclerotic stage with new bone formation and osteosclerotic changes.

    The radiological classification has very litle value in deciding orthpaedic treatment of pyogenic spondylodiscitis, but helps to increase the index of clinical suspicions and diagnosis.

3. Classification based on the enhanced MRI findings, has five stages:

    a. Stage I, bruise and localised radiolucency in the endplate of the vertebra;

    b. Stage II, vertebral oedema and

    c. Stage III, stage of signals suggestive of subligamentous collection;

    d. Stage IV, stage of fluid collection in the disc, extensive endplate destruction and diffusely extended high-signal lesions in the vertebral corpus and SEA; and

    e. Stage V, stage of vertebral collapse with in homogenously increased signal intensity, epidural fluid collections and abnormally increased signal intensity in the vertebrae, paravertebral ligaments and muscles.

    Stage I - III abscesses are contained lesions while stage IV and V lesions, with ring-like enhancement in the periphery of the abscess are uncontained lesions [3].

    The MRI staging highlights the pathology aptly and is useful in planning orthopaedic treatment, but alone it is not adequate for taking surgical decisions. Therefore, the combination of Clinical and radiological findings as contained in the new clinical-radiological classification would be a useful tool in planning and decision making in orthpaedic treatment of pyogenic spondylodiscitis.

4. Spinal infections are also classified based on the infecting pathogens as pyogenic, granulomatous and parasitic. Anatomical classification include vertebral osteomyelitis (spondylitis), discitis and epidural abscess or regional involvement such as lumbar, thoracic, cervical and sacral pyogenic spondylodiscitis. Based on the route of spread PS can be of haematogenous origin, by direct inoculation and spread from a contiguous source.

5. Spondylodiscitis severity code: This grading system was proposed by Homagk L., *et al*. in 2015 [11] based on a clinico-radiological classification of severity of pyogenic spondylodiscitis. They identified 3 severity grades of spondylodiscitis on account of vertebral body destruction, deformity, SEA, neurological deficit and paraspinal abscesses with stage - depended treatment recommendations. Grade I is a simple discitis; Grade II is PS with unstable destruction of vertebral bodies, and Grade III is PS with neurological deficits. Conservative treatment was recommended for grade I and surgery for grade II and III. Twelve weeks of targeted antibiotic therapy was recommended for all grades. The main difference between the Homagk and Pola classification is the introduction of subclasses in the new clinical - radiological classification.

Pathogens

Staphylococcus aureus is the common pathogen in majority of cases [1-3]. However, gram negative infections have been increasing over the last decades and often associated with gram negative infections of the genito-urinary and gastrointestinal tracts. *Pseudomonas* infections are usually seen in patients with intravenous drug use and *Salmonella* infections are seen in patients with sickle cell anaemia. Methicillin Resistant *Staphylococcus aureus* (MRSA) remains a matter of concerns in the treatment of PS in some settings [2]. A polymicrobial cause is unusual in spontaneous pyogenic spondylodiscitis and accounts for no more than 2.5% of cases. However, polymicrobial infections are more common in sacral osteomyelitis including anaerobic pathogens related to a contiguous spread of infection from pressure ulcerations. Anaerobic infections may account for 3% of axial skeleton infections. They are more common in diabetics patients and are caused by *Bacteroides spp., Peptococcus spp. and Propionibacterium acnes.* Unusual causative organisms include *Salmonella typhi* and *paratyphi, Bartonella henselae, Clostridium perfrigens, Coxiella burnetii, Capnocytophaga canimorsus, Echinococcus granulosus, Actinomyces isrealii, Norcadia spp., Crytcoccus neoformans* and *Scedosporium apiospermum*. Other infections of note are fungal, tuberculosis, brucellosis and parasitic infestations which are uncommon but are usually seen in immunocompromised patients [1,2,12].

Pathogenesis

The route of infection is either haematogenous via arteries and veins (through Batson's plexus in the lumbar spine and pre-vertebral pharyngeal venous plexus in the cervical spine) or by direct inoculation through diagnostic and surgical procedures or following penetrating trauma and open fractures. In 37% of cases there is no identifiable source and in 5% of cases there is history of blunt trauma to the spine.[1] The involvement of adjacent segments of contiguous vertebrae in PS is because the same segmental artery supplies an intervening disc as well as the adjoining parts of adjacent vertebrae [1].

There could also be contiguous spread from local infection, as is seen in retropharyngeal and retroperitoneal abscesses.

Pathology

The pathology in pyogenic spondylodiscitis is facilitated by the effects of septic thrombi, products of inflammatory response including release of proteolytic enzymes and production of biofilm. *Staphylococcus aureus* spondylodiscitis is associated with frequent relapse owing to it's ability to produce protective biofilm, and adheres to dead bones and steel implants readily.

Infection of the vertebral disc in children is quite different from vertebral infection in adult owing to rich anastomosis between equatorial and circumferential superficial metaphyseal arteries which atrophy by the age of 15 years. In children, pyogenic discitis may occur after bacteremia owing to persistent vascular channels whereas in adults, the disc is avascular, and vertebral osteomyelitis is common in the early stages of the disease and The spread to the disc through the endplate is usually late. The spread of infection to adjacent vertebral bodies in children occurs through bridging anastomotic vessels from one metaphysis to another [1].

Spontaneous pyogenic spondylodiscitis is a result of haematogenous spread from septic foci resulting in bacteremia [1,12,13]. PS from the disc or vertebral body may spread to the subligamentous paravertebral area forming paravertebral and intramuscular abscesses, the spinal epidural space forming spinal epidural abscess and contiguous vertebral bodies causing collapse and deformity [1,14].

Neurologic deficits may result from complications of PS such as spinal epidural abscess and deformity of the spine. Spinal epidural abscess is an important associated condition of pyogenic spondylodiscitis in 18% of cases and 50% of patients with spinal epidural abscess will have neurologic symptoms [2,7,8].

Clinical presentation

High index of clinical suspicions in combination with radiological and microbiological investigations are vital in the early diagnosis of pyogenic spondylodiscitis. Back or neck pains are common symptoms. Majority of patients present late, more than three months before the diagnosis is made [1,15]. Eliciting history of Urinary tract infections, pneumonia, skin infections and organ transplant are important. Patients with retropharyngeal abscess may complain of dysphagia. Localized spinal pain is present in 90% which is exacerbated by movement and associated with radiculopathy in majority of cases [1,16,17]. Fever in 52% of cases, but chill or fever spikes are uncommon [1].

Paravertebral muscle spasm, tenderness and limitation of spine movement represent predominant signs. Neurologic complications due to spinal epidural abscess and spinal deformity are not uncommon [1,15,17-19].

Laboratory findings

White blood cell counts often normal, but may be elevated in 35-50% of cases but rarely exceeds 12,000 cell/mm^3. Erythrocyte Sedimentation Rate (ESR) is elevated in 90% of cases, although not specific, it is a useful blood marker in monitoring response to treatment; and with appropriate medical treatment, a progressive decline of the ESR is usually encountered [1,20]. C-Reactive Protein (CRP), although nonspecific, but clinically a more useful blood marker than the ESR, and it is a better index used to follow the course of the infection [1,21]. Elevated in 90% of cases. Blood, urine and focal suppurative process should be cultured. Positive blood culture is helpful in guiding the choice of antimicrobial therapy in dire emergency. Direct biopsy specimen from the lesion is the best means of identifying the pathogens.

Image guided percutaneous needle biopsy can be performed with a diagnostic accuracy rate of 70 - 100% and open biopsies are diagnostic in more than 80% of cases [1,22]. Open biopsy however has a higher associated morbidity [1,23]. Generally local tissue specimens could be obtained through fine needle aspiration biopsy or core needle biopsy or endoscopic biopsy or open biopsy in ascending order of preference. Culture should be sent for aerobic, anaerobic, fungal and acid-fast bacilli. Specimens should also be sent for Polymerase Chain Reaction (PCR) and histopathology assays.

The diagnostic accuracy of Non-culture amplification-based DNA analysis is high and useful in negative cultures and in the choice of species- specific antibiotic therapy [1,24].

On first principles, antibiotic therapy should be held until cultures have been obtained, except if there is threat to life. In ideal situations specimens should usually be sent for bacteria, fungi, brucella and mycobacteria assays.

Radiographic evaluation

Plain radiograph

Routine radiographs of the spine has a diagnostic delay period of 3 - 6 weeks [1,25]. First sign is irregularity of the vertebral end-plate of the infected level. Other findings include: erosion of endplate and adjacent bone, narrowing of disc space, segmental collapse, loss of lordosis, structural deformity, reactive sclerosis as evidence of bone regeneration is seen between 8 - 12 weeks [1,26], and fusion across the disc space with successful treatment.

C-T scanning

Computed Tomography (CT) Scanning is a valuable tool useful for surgical planning, improved yield of biopsy, zones of endplate erosion are more obvious and seen earlier than routine radiograph [1].

MRI

Magnetic Resonance Imaging (MRI) Scanning has higher sensitivity than bone scan and remains the gold standard in the evaluation of pyogenic spondylodiscitis characteristic findings, early in the disease with sensitivity of 96%, specificity of 92% and diagnostic accuracy of 94% [1,27]. The MRI is use for monitoring of therapeutic response [1,28]. In response to inflammatory oedema of pyogenic spondylodiscitis the MRI signal within the bone is reduced resulting in darkening of the marrow on T_1 - weighted sequences. On T_2 - weighted images the disc signals are bright because of the increase in fluid content.

T_1 - weighted scan following intravenous infusion of gadolinium-diethylenetriamine pentaacetic acid (Gd-DPTA) contrast agents may show enhancement at the endplate - disc interface fairly early in the course of the infection within 1-2 weeks [1].

T1 - gadolinium sequences may be useful in differentiating between spinal epidural abscess and granulation tissue. In the presence of abscess the image would show peripheral circular enhancement while diffuse enhancement throughout the mass is more consistent with granulation tissue. Contrast - enhanced MRI may be used to differentiate tubercular and pyogenic spondylodiscitis [29].

The enhanced MRI findings in Tubercular Spondylodiscitis (TS) and Pyogenic Spondylodiscitis (PS) are summarized thus: enhanced abscess wall in TS presents as a ring of thin and smooth wall (egg shell) while a thick and irregular abscess wall is common in PS; peripheral enhancement is a common feature in epidural abscesses while homogeneous enhancement is common with granulation tissue; presence of intraosseous abscess is a common finding in TS but more of intradiscal abscess in PS; a well-defined paraspinal abnormal signals in TS while a diffuse abnormal signal is in keeping with PS; a focal and heterogeneous enhancement of vertebral body is common in TS while a diffuse and homogeneous enhancement of vertebral body is common in PS; there are more significant vertebral destruction in TS while less significant vertebral destruction is seen in PS; there is loss of cortical definition in TS while cortical definition is maintained in PS; and there is significant spinal deformity in TS while spinal deformity is less in PS [29].

Radionuclide bone scanning

Radionuclide bone imaging studies have limited use with wide spread availability of MRI. Scanning with technetium-99m pyrophosphate is positive within 1 - 2 days of infection and is highly sensitive.

Sequential bone/Gallium imaging and 67Ga - SPECT (Single Positron Emission Computed Tomography) are currently the radionuclide procedures of choice for spinal osteomyelitis, but the drawbacks are low specificity, poor spatial resolution and lengthy procedure time.

Fluoro-2-Deoxy-D-Glucose (FDG) PET (Positron Emission Tomography) is a promising technique that is highly sensitive with superior image resolution [1,30]. PET/CT is more effective than MRI in distinguishing between tuberculosis and pyogenic spondylodiscitis [1,31], with specificity of 75 - 80%.

Differential diagnosis

Differential diagnosis of adults presenting with back pain include: degenerative spinal diseases, metastatic spinal diseases in which the disc is spared, disc herniation, vertebral compression fractures, inflammatory spondyloarthropathies such as ankylosing spondylitis and reactive arthritis [1,32]. Other differentials include granulomatous spine infections such as tuberculosis and Brucellosis; fungal infections and parasitic infestation [1]. These differentials could be grouped into: inflammatory, neoplastic, degenerative and granulomatous disease processes [1,15]. The inflammatory diseases include: pyelonephritis, appendicitis, abdominal abscesses and bowel infarction. These may

have similar clinical feature with pyogenic spondylodiscitis. Tumors of the spine may be primary or secondary which occasionally simulate the radiological pictures of infections, but the disc in tumors are atypical. Pyogenic spondylodiscitis involves the disc, while neoplasm involves the vertebral body and spare the disc. Degenerative diseases including disc herniation with disc space collapse, desiccation, bulge, end-plate erosion or annular tear may present similar MRI images.

Osteoporosis presents with vertebral collapse. Tuberculosis, Brucellosis, Aspergillosis, Candida tropicalis, blastomycosis and coccidioidomycosis are good differentials in culture negative pyogenic spondylodiscitis [1,33].

Complications

These vary with level of the spine involved, in the cervical spine, retropharyngeal abscess is a typical complication. In the thoracic spine, mediastinitis and at all levels complications include: spinal epidural abscess and granuloma, subdural abscess, meningitis, intramuscular abscesses, loss of lordosis, segmental collapse with spinal instability, progressive deformity and neurological deficit.

Epidural abscess is common in the anterior aspect of the canal, spreading from the posterior parts of the vertebral body and disc space. MRI with contrast can differentiate between epidural granulation tissue and epidural abscess [29]. Epidural abscess is common in the cervical spine in 90% of cases with increased risk of complications, 33.3% in thoracic and 23.6% in the lumbar spine [1].

The long term sequalae of vertebral osteomyelitis include late presentation and chronic debilitating diseases which are predictors of worse outcome.

Irreversible paralysis occurs in 4 - 22% of cases with SEA. The mortality rate of vertebral osteomyelitis is between 2-20% and in SEA is 5% [1-3].

Treatment and outcome

The major problem with treatment outcome is late diagnosis. Early diagnosis requires high index of suspicion with emphasis on predisposing factors. Treatment is either non-operative or operative with clear goals involving a multidisciplinary groups of experts.

The goals of treatment

The goals of treatment include: eradication of infection, prevention of sepsis, preservation or establishment of spinal stability, relieve of pains, prevention or reversion of neurological deficits and prevention of recurrence [1-3].

Non operative treatments

This involves the appropriate use of antimicrobial agents and rigid support for the spine. The general principles of non-operative treatment entails use of standard antibiogram, appropriate use of antibiotics, spinal immobilization, careful monitoring of patient for evidence of spinal instability and neurological deficit [1,2].

Immediate broad spectrum antibiotic is advocated in critically ill patient who are septic, provided specimens are taken for gram stain and culture before starting antibiotics. Immediate CT guided aspiration prior to administration of intravenous antibiotics is necessary in blood culture negative cases and open biopsy is indicted when blood/ aspiration cultures are negative.

In principles, organism-specific antibiotic are given for 6 - 12 weeks with supportive rigid bracing. Usually, intravenous culture specific antibiotics are given until signs of improvement are seen within 4 - 6 weeks and then converted to oral antibiotic for another 4 - 8 weeks, according to patient's response. Empirical intravenous broad spectrum antibiotics with good bone penetration are used prophylactically while waiting for culture results. Vancomycin and Quinolones are recommended for penicillin-resistant gram-positive bacteria. Rifampi-

cin is active against biofilm embedded bacteria and has synergistic effects with other beta - lactam antibiotics and would be considered for use in implant surgery complicated with PS [34]. Targeted antibiotic therapy based on the antibiogram suffices in majority of cases. Treatment should involve group of experts that will ensure standard of care and optimal outcomes. The team must keep abreast with the development of resistant strains of pathogens.

Some of the resistant strains include: Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant *Staphylococcus aureus* (VRSA) and Vancomycin Resistant *Enterococcus* (VRE). Treatment of these resistant strains will require newer generation antibiotics such as Linezolid and Daptomycin.

Activity restriction is an important aspect of treatment for acute pains. Bracing of the spine as part of non-operative treatment helps to improve pain and prevent deformity. Rigid Cervico-Thoracic Orthosis (CTO) or halo is required for cervical osteomyelitis and rigid Thoraco-Lumbo-Sacral Orthosis (TLSO) is required for thoracic infections and a Lumbo-Sacral Orthosis (LSO) for lumbar and sacral spine pyogenic spondylodiscitis. The outcomes of nonoperative treatment is successful in 75 - 80% of cases [2,34,35].

Spontaneous interbody fusion is expected with successful non-operative treatment within 6 - 12 months. However, relapse rate of 14% and major complications remain challenges to cure [34,35].

Patients with PS on conservative treatment require careful monitoring for evidence of healing or complications. This can be done through clinical, laboratory and radiological evaluations.

Operative treatment

Only 10 - 20% of patients suffering from pyogenic spondylodiscitis require open surgery [2]. Emergency surgical treatment is reserved for acute complications of PS such as unstable deformity, SEA and neurological deficit [34].

The options of operative treatment would include: open biopsy, neurological decompression, surgical debridement and spinal stability.

Approach for open biopsy could be transpedicular or costotransverse-ectomy with better yield of culture results.

The approach to neurologic decompression, surgical debridement and spinal stabilization is dictated by the location of the pathology. Anterior decompression and stabilization plus or minus posterior instrumentation is considered to be gold standard. Pyogenic spondylodiscitis involves the anterior vertebral elements in majority (95%) of cases and some degree of stability is maintained by intact posterior elements, therefore decompression laminectomy alone is not advocated as it may further destabilise the spine and results in an increased neurological deficit [1].

Retropharyngeal approach may be necessary to reach the proximal cervical spine. In subaxial cervical spine, a standard Smith-Robinson approach is adequate. Approach to the thoracic spine can be achieved anteriorly by thoracotomy. In the lumbar spine, retroperitoneal approach is advisable. Posterolateral extracavitary approaches in the thoracic and lumbar spine is used for dealing with anterior vertebral column pathologies, but may be technically more difficult especially when there is extensive epidural adhesion due the infection. In uncomplicated cases minimal access surgeries and/or endoscopic procedures may be considered for drainage of abscesses, debridement and stabilization of the spine.

The goals of anterior debridements and strut grafting plus or minus posterior instrumentation are: to identify organism, to eliminate infection, to prevent or improve neurologic deficits and to maintain spinal stability. The best material for strut grafting is the autogenous tricortical iliac or fibula struct grafts, save for the graft site morbidity. Other materials being used include allograft and Titanium mesh cages.

Spinal instrumentation in the presence of infection requires careful planning. Therefore, incision and drainage followed by stage instrumentation has been advocated. A single stage procedure with bone graft and instrumentation in the presence of an active infection

can be done, however, Titanium with less tendency to bacterial biofilm adhesion is preferred over stainless steel. A single or two stage posterior instrumentation is indicated with severe kyphotic deformity or when multilevel anterior construct is required.

Conclusion

Majority of pyogenic spondylodiscitis are amenable to nonoperative treatment. Surgical interventions are reserved for few complicated cases. The major challenges in the current management of PS is late presentation and diagnosis. Therefore, high index of clinical suspicion, adequate laboratory investigations and early use of contrast enhanced MRI will allow for early diagnosis and prompt treatment with excellent patient outcome.

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