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Case report
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Surgical Precision in Lumbar Spinal Canal Stenosis: Optimizing Outcomes in a Young Adult with Suspected Infection through Decompression-Stabilization-Fusion

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ABSTRACT

Background: This case report examines the uncommon occurrence of Lumbar Spinal Canal Stenosis (LSCS) in a 23-year-old male patient, highlighting the diagnostic challenges and unique aspects of managing this condition in young adults. Typically associated with aging and degenerative changes, LSCS poses a diagnostic dilemma when encountered in a young individual with nonspecific causation.

Case Presentation: The patient reported persistent lower back pain since February 2023, primarily on the right side, escalating over the past three months. The pain intensified during prolonged sitting, standing, and walking, alleviated by lying down and analgesics. Radiating pain to both buttocks and legs, particularly on the right side, accompanied a four-month history of persistent right foot numbness. Referred from RS Siloam Kupang to RSAD Denpasar and subsequently to RSUP Prof IGNG Ngoerah, the patient received a diagnosis of Lumbar Spinal Canal Stenosis at L2-L3-L4, L5-S1, with suspected Spondylitis TB.

Results: This case underscores the intricacies of diagnosing Lumbar Spinal Canal Stenosis in young adults, emphasizing the exploration of non-traditional causes. The patient underwent Debridement-Decompression-Stabilization-Fusion-Biopsy+Culture, experiencing postoperative improvement. Cultures showed no growth, and biopsy results were nonspecific. The final diagnosis was Lumbar Spinal Canal Stenosis at L2-L3-L4, L5-S1 due to Spondylitis TB dd/Pyogenic Infection, with bilateral Neural Foraminal Stenosis Grade III at L5. The discussion focuses on the rarity of this presentation in young individuals, challenges in diagnosis, and the efficacy of decompression-stabilization-fusion treatment for achieving positive outcomes in young adult patients.

Conclusion: The case discussion emphasizes the complexity of managing Lumbar Spinal Canal Stenosis in a young adult, particularly when infection is suspected. The decision to pursue Decompression-Stabilization-Fusion was rooted in the patient's age, the need for structural stability, and the suspicion of infection.

Keywords: Lumbar spinal canal stenosis, infection, spondylodiscitis, young adult

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BACKGROUND

Lumbar Spinal Canal Stenosis (LSCS), traditionally associated with aging and degenerative changes, is examined in this case report through an unusual lens—the occurrence in a young adult. Typically characterized by the narrowing of the lumbar spinal canal due to degenerative alterations in facet joints, ligamentum flavum, and intervertebral discs, LSCS poses a diagnostic challenge when manifesting in individuals outside the conventional geriatric age group. This report scrutinizes a distinctive presentation, exploring the suspicion of infection as a probable cause in this young adult case (Tani *et al.*, 2022).

The epidemiology of LSCS traditionally centers on its prevalence among individuals aged 60 and above (Timothy *et al.*, 2019; Tani *et al.*, 2022). However, the emergence of this condition in a 23-year-old male patient prompts an inquiry into the potential infectious etiology, challenging existing paradigms and necessitating a reevaluation of diagnostic and treatment approaches. Diagnosing LSCS in young adults introduces a novel dimension to clinical considerations, as the clinical presentation may deviate from the classical symptoms observed in older individuals (Viezens *et al.*, 2017). This manuscript navigates through the diagnostic intricacies of LSCS in young adults, emphasizing the importance of comprehensive evaluation and the exploration of non-traditional causes, with a particular focus on infectious etiologies.

Moreover, the suspicion of infection introduces a nuanced layer to the optimal management strategy for LSCS in young adults. While surgical interventions such as decompression, stabilization, and fusion have proven effective in older populations, their application in the context of suspected infection requires careful consideration. Balancing the potential benefits of intervention with the complex implications of managing infection in a younger demographic forms a critical aspect of the treatment paradigm (Farah et al., 2020; Tachibana et al., 2020; Wang et al., 2020).

CASE PRESENTATION

The 23-year-old male patient presented with a chief complaint of persistent lower back pain since February 2023, primarily localized to the right lower back. Over the course of the last three months, the pain had become increasingly debilitating, particularly exacerbated by prolonged sitting, standing, and walking. Conversely, relief was noted with lying down and the use of analgesic medications. The patient described additional symptoms, including radiating pain to both buttocks and legs, with a notable emphasis on the right side. Furthermore, the patient reported a four-month history of persistent right foot numbness.

Referred from RS Siloam Kupang to RSAD Denpasar and subsequently to RSUP Prof IGNG Ngoerah, the patient underwent a thorough clinical examination and neurological assessment. Swelling was identified at the L4-L5 level, with midline tenderness noted at L5-S1. Neurologically, there was hypoesthesia at the S1 level on the right side. Magnetic Resonance Imaging (MRI) was conducted, revealing spondylodiscitis at L5-S1, accompanied by a paravertebral abscess. This abscess extended into the prevertebral space and spinal canal, causing severe narrowing of the spinal canal, neural foraminal compression, and involvement of adjacent lumbar levels. Patient is an army officer and patient never had any prior medical history.

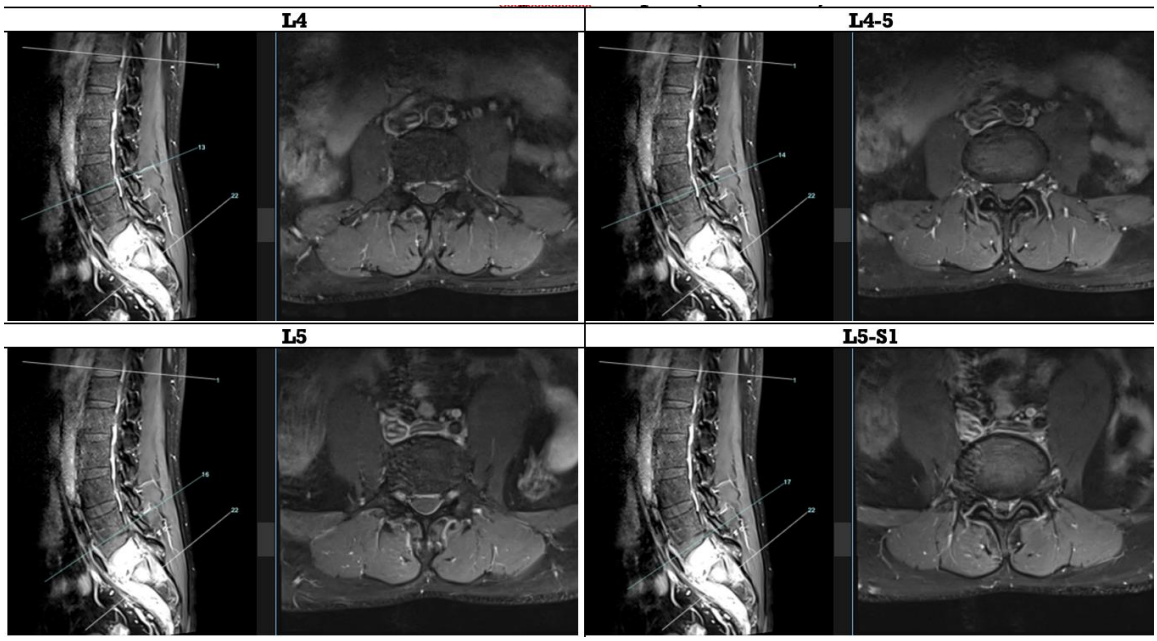

Figure 1. Lumbosacral Spine MRI T1W Axial View with Contrast

RESULTS

The patient's baseline functional status was assessed using the Oswestry Disability Index (ODI), revealing a preoperative score of 33 points, indicative of moderate disability. Despite these challenges, the patient, at present, could still ambulate without the need for assistive devices. However, daily activities were significantly disrupted due to persistent pain. The final diagnosis was Lumbar Spinal Canal Stenosis at L2-L3-L4, L5-S1, with suspected Spondylitis TB. Given the suspicion of infection, the patient underwent Debridement – Decompression - Stabilization – Fusion – Biopsy + Culture. Cultures showed no growth, and biopsy results were nonspecific. Postoperatively, the patient's symptoms gradually improved, with the ODI score notably decreasing to 10 points, indicating a significant enhancement in functional status.

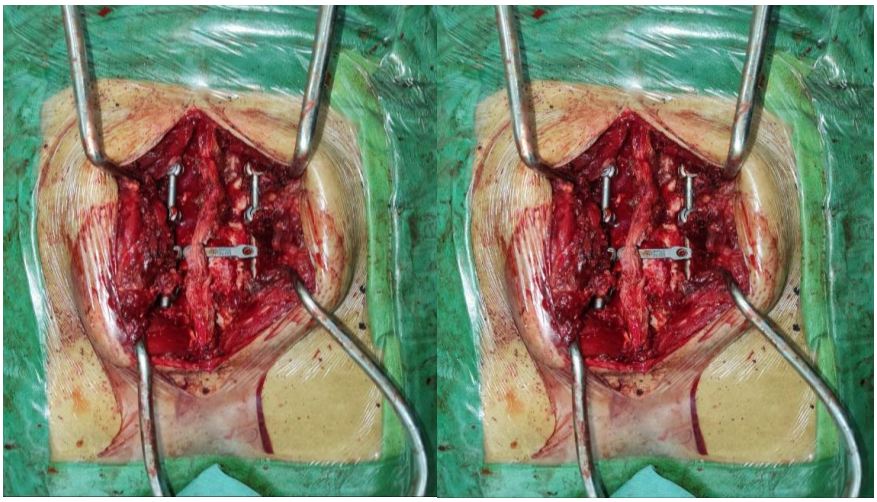

Figure 2. Clinical Picture during Surgery

Figure 3. Post Operative X-ray

This case presentation underscores the complexity of diagnosing and managing Lumbar Spinal Canal Stenosis in young adults, especially when infectious etiologies are suspected. The utilization of the ODI score provides a quantitative measure of the patient's functional disability and highlights the substantial improvement achieved postoperatively.

DISCUSSION

The presented case of Lumbar Spinal Canal Stenosis (LSCS) in a 23-year-old male underscores the unique challenges associated with diagnosis and management in a young adult demographic, particularly when infectious etiologies are suspected. The decision-making process regarding the choice of treatment modalities becomes paramount, especially when faced with nonspecific biopsy and culture results.

In the context of Lumbar Spinal Canal Stenosis, the age of the patient introduces a distinctive set of considerations. Conventionally viewed as a condition associated with aging, the manifestation in a young adult prompts a reevaluation of diagnostic paradigms and therapeutic strategies. This case supports the growing body of evidence suggesting that LSCS can indeed occur in younger individuals, necessitating a nuanced approach to both diagnosis and treatment (Shetty *et al.*, 2016; Nojiri *et al.*, 2020).

The suspicion of infection, despite inconclusive biopsy and culture results, further complicates the decision-making process. In cases where infectious etiologies are suspected, achieving a balance between addressing the potential infection and providing structural stability is crucial.(Lu et al., 2015) In this scenario, the chosen treatment approach involved Debridement-Decompression – Stabilization – Fusion - Biopsy + Culture, incorporating both decompression and stabilization with fusion.

Decompression-Stabilization-Fusion emerged as the preferred treatment option for several reasons. Firstly, the patient's young age played a pivotal role in the decision-making process. The goal was not only to alleviate the immediate symptoms but also to ensure a durable and functional outcome over the long term. Given the potential longevity of the patient, preservation of spinal stability and prevention of recurrent stenosis were prioritized. (Viezens et al., 2017; Alaid et al., 2018;

Farah et al., 2020; Nojiri et al., 2020; Tachibana et al., 2020; Tani et al., 2022).

Additionally, the suspicion of infection contributed to the decision for surgical intervention. While biopsy and culture results were nonspecific for any infectious agent, the clinical presentation, including the paravertebral abscess and the involvement of adjacent spinal levels, warranted a comprehensive approach. Decompression – Stabilization - Fusion not only addressed the infectious component through debridement but also provided structural stability and neural decompression, enhancing the likelihood of a successful outcome.

The postoperative improvement, as reflected in the Oswestry Disability Index (ODI) score decreasing from 33 to 10 points, highlights the efficacy of the chosen treatment approach. This substantial improvement in functional status aligns with the goals of intervention in young adults, aiming not only for symptomatic relief but also for the restoration of daily activities and overall quality of life.

In conclusion, the case discussion emphasizes the complexity of managing Lumbar Spinal Canal Stenosis in a young adult, particularly when infection is suspected. The decision to pursue Decompression – Stabilization - Fusion was rooted in the patient's age, the need for structural stability, and the suspicion of infection. Despite nonspecific biopsy and culture results, the chosen approach yielded a remarkable functional outcome, supporting the viability of this treatment modality in young patients with LSCS and suspected infection. Further research is warranted to refine treatment algorithms and enhance our understanding of the optimal management of such complex cases.

AUTHOR CONTRIBUTION

I Gusti Ngurah Paramartha Wijaya Putra is an expert, conceptual, editing, reviewing. Febyan and Nyoman Gede Grenata Nanda Ustriyana searches for literature, editing, reviewing.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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