بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

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Interventions for Lumbar Synovial Facet Joint Cysts: Comparison of Percutaneous, Surgical Decompression and Fusion Approaches Systematic Review and Meta-Analysis

Systematic Review for Partial Fulfilment of Master Degree in Orthopaedic Surgery

By

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Mohamed Salah Mohamed Barakat

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List of Abbreviations

Abb.	Full term
AP	Accessory processes
CD	Cannot determine
CSF	Cerebrospinal fluid
DR	Dorsal ramus
EZ	Elastic zone
FJC	Facet joint cyst
FJOA	Facet joint osteoarthritis
L1-L5	Lumbar spine is formed of 5 vertebrae
LFCL	Capsular Ligament
LFJs	Lumbar Facet Joints
LISC	Lumbar intraspinal synovial cysts
MAL	Mammilo-accessory ligament
MD	Mean difference
MP	Mammillary
NA	Not applicable
NR	Not reported.
NZ	Neutral zone
OMA	Open Meta Analyst
PFZ	Pain free zone
RCTs	Randomized controlled trials
ROM	Range of motion
RR	Risk ratio
SSCs	Spinal synovial cysts
VR	Ventral ramus
WOS	Web of Science

ABSTRACT

Background: Lumbar facet cysts are a rare but increasingly common cause of symptomatic nerve root compression and can lead to radiculopathy, neurogenic claudication, and cauda equina syndrome.

Aim of the Work: The present systematic review aims to illustrate the clinical and radiological outcomes when using percutaneous versus surgical decompression of lumber synovial facet joint cysts with or without fusion.

Material and Methods: A total of 16 studies were included for the final qualitative and quantitative analysis in the current systematic review. The overall quality was moderate to high quality regarding the quality of both RCTs and observational studies.

Results: Twelve of the included studies reported the outcome of reoperation rate after surgical decompression procedure for lumber synovial facet joint cysts. The pooled analysis of the included studies showed a significant decrease in reoperation rate after surgical decompression regarding the synovial facet joint cyst favoring the surgical decompression technique over the percutaneous technique. Seven of the included studies reported the outcome of reoperation rate after percutaneous procedure for lumber synovial facet joint cysts. The pooled analysis of the included studies showed no significant decrease in reoperation rate after percutaneous procedure regarding the synovial facet joint cyst favoring the surgical decompression technique over the percutaneous technique.

Conclusion: The surgical decompression technique is a favored intervention for lumbar synovial facet joint cysts over the percutaneous technique regarding the postoperative resolution and recurrence rate.

Keywords: Lumbar Synovial Facet Joint Cysts, Percutaneous, Fusion Approaches

INTRODUCTION

Lumbar facet cysts are a rare but increasingly common cause of symptomatic nerve root compression and can lead to radiculopathy, neurogenic claudication, and cauda equina syndrome. The cysts arise from the zygapophyseal joints of the lumbar spine and commonly demonstrate synovial herniation with mucinous degeneration of the facet joint capsule. Lumbar facet cysts are most common at the L4-L5 level and often are associated with spondylosis and degenerative spondylolisthesis [(1)].

Advanced imaging studies have increased diagnosis of the cysts; however, optimal treatment of the cysts remains controversial. First-line treatment is nonsurgical management consisting of oral NSAIDs, physical therapy, bracing, epidural steroid injections, and/or cyst aspiration. Given the high rate of recurrence and the relatively low satisfaction with nonsurgical management, surgical options, including hemilaminectomy or laminotomy to excise the cyst and decompress the neural elements, are typically performed. Recent studies suggest that segmental fusion of the involved levels may decrease the risks of cyst recurrence and radiculopathy [(1)].

The lumbar spine exhibits a complex relationship between soft-tissue and bony articulations that provide stability throughout the range of motion. On microscopic analysis, the capsule is composed of two layers, with a denser collagenous outer layer and an elastic inner layer similar in composition to the

ligamentum flavum. The outer collagenous fibers demonstrate complex orientations; superiorly, the fibers are oriented medial to lateral to resist distraction, whereas inferiorly, the fibers are oriented inferior to superior to limit forward rotation. To further strengthen the capsular restraints the outer layer is reinforced structurally by the tendinous investiture of the multifidus muscle, with an overall structure designed to create maximum resistance to flexion [(2)].

The sagittally oriented facet joints allow flexion and extension while limiting flexibility in rotation and lateral bending. This intrinsic stability protects the neural elements from potentially dangerous motions, such as excessive torsion, shear, and/ or translation. The superior articular process faces dorsomedially, with the inferior articular process directed ventrolaterally, supporting both compressive loads and structural blocks to motion [(3)]. During motions of lateral bending and twisting, the facet joints display complex motions of rotation and translation in multiple planes. Many papers conducted an in vivo analysis of lumbar facet joint kinematics, reporting an average of 3.5 mm of translation cephalad/caudad and 6.5 of rotation in the mediolateral axis [(4)].

Facet cysts arise from the zygapophyseal joints of the lumbar spine. Knowing how the paired facet joints interact with the intervertebral disk is crucial to understanding degenerative disk disease and facet cyst formation. This complex interrelation includes three stages: dysfunction, segmental instability, and subsequent stabilization as the degenerative process advances [(5)].

Conservative treatment modalities include no treatment, bed rest, oral analgesics, physical therapy, orthopedic corsets, chiropractic care, CT-guided needle aspiration and intra-articular injection of corticosteroid drugs and cyst punctures [6].

Surgical treatment is largely recommended in all cases of intractable pain or neurological deficit. The surgical technique will depend on the site, size and associated other factors of the cysts, e.g., duration of symptoms and involvement of surrounding structures etc. in general current therapy for synovial cysts includes excision of the mass (total or partial) and lumbar decompression [5].

AIM OF THE WORK

To conduct a systematic review illustrating the clinical and radiolgical outcomes when using percutaneus versus surgical decompression of lumber synovial facet joint cysts with or without fusion.

ANATOMY OF THE LUMBAR SPINE

Osseous structures

Lumbar spine is formed of 5 vertebrae (L1-L5), motion segments exist between two adjacent vertebrae in the lumbar spine. These motion segments articulate through the two posterior zygapophyseal (facet) joints and the anterior intervertebral disc. Other than these components of the vertebral column, the spine remains relatively static and immobile due to both osseous and ligamentous structures [(7)].

The lumbar vertebra has anterior elements that consist of the vertebral bodies, middle elements consisting of the pedicles, and posterior elements consisting of the facet joints, the lamina, spinous processes, and transverse processes. The anterior elements sustain compressive loads applied to the spine, whereas the posterior elements control spinal motion through the ligaments and muscles attached to these osseous structures [(8)].

The middle elements connect the anterior vertebrae body to the posterior elements, and transfer loads between these components. The nerve roots exit the spinal column via the neural foramina, and oval shaped space surrounded by osseous structures from two adjacent vertebrae [(9)].