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Surgical Outcomes and adverse effects for Minimally Invasive versus Open Posterior Lumbar Interbody Fusion

A Systematic Review and Meta-Analysis

Submitted for Partial Fulfillment of Master Degree in Orthopedic Surgery

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List of Abbreviations

Abb.	Full term
ALIF	Anterior lumbar interbody fusion
ASD	Adjacent segment disease
CI	Confidence intervals
CK	Creatinine kinase
LLIF	Lateral lumbar inerbody fusion
LOS	Length of hospital stay
MIS	Minimally invasive surgery
MISSTs	Minimally invasive spine surgery techniques
MI-TLIF	Minimal invasive transforraminal lumbar interbody fusion
ODI	Oswestry Disability Index
OLIF/ATP	Oblique lumbar interbody fusion /anterior to psoas
OR	Odds ratio
PLIF	Posterior lumbar interbody fusion
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Randomized controlled trial
SSI	Surgical site infection
TLIF	Transforaminal lumbar interbody fusion
VAS	Visual analogue scale
XLIF	Extreme lateral interbody fusion

INTRODUCTION

Lumbar spinal fusion is an accepted method of treatment for a variety of spinal pathologies. As the proportion of adults older than 65 years continues to rise, the demand for spinal fusion procedures, particularly for degenerative disorders, continues to increase [(1)].

There are many approaches for lumbar interbody fusions (*figure 1*). The main five are anterior (ALIF), transforaminal (TLIF), posterior (PLIF), lateral or extreme lateral (LLIF or XLIF) and oblique/anterior to psoas (OLIF/ATP).[(2)]

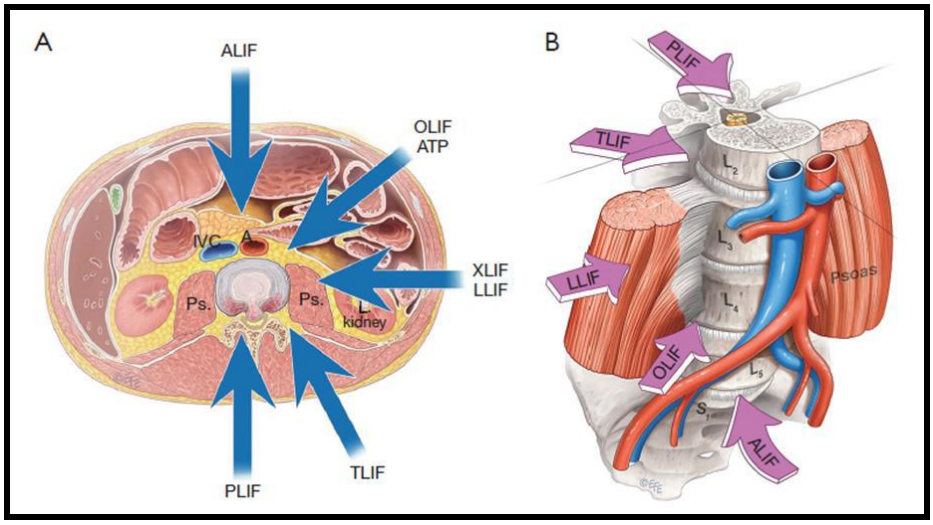

Figure (1): Surgical approaches to the lumbar spine for interbody fusion techniques[(2)].

Unfortunately, the substantial blood loss, high complication rates and prolonged hospital stay associated with traditional open

midline techniques of spinal fusion may expose this patient population to an undesirable level of surgical morbidity [3].

Conventional lumbar fusion is also associated with significant muscle stripping and retraction that can adversely affect both short and long term patient outcomes [3].

Various minimally invasive spine surgery techniques (MISSTs) have been developed recently with the aim of improving clinical outcomes as opposed to traditional procedures. MISSTs have no universally accepted definition, but all of these techniques aim to reduce iatrogenic complications and postoperative pain, promote faster recovery, and allow patients an earlier return to their normal daily activities. Further benefits include reduction of operative blood loss, shortening of hospital stay, reduced need for analgesics, smaller incisions, and preservation of posterior motion segments and paraspinal muscles. Several MISSTs have been introduced recently [4].

Minimally invasive lumbar fusion is performed via a muscle dilating approach and significantly diminishes the amount of iatrogenic soft tissue injury. As a result, the new procedures have shown the potential to reduce the amount of intra operative blood loss, the intensity of postoperative pain and the duration of hospital stays. [5]

The goal of any minimally invasive procedure is to achieve the same surgical objectives as the corresponding open procedure