

## OUTCOMES OF SPINAL FUSION PERFORMED IN AN AMBULATORY SURGICAL CENTER

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**Study Design:** Retrospective cohort study

**Objective:** To assess the efficiency, safety, and cost effectiveness of Transformational Lumbar Interbody Fusions (TLIF) performed at an ambulatory surgical center.

**Introduction:** Re-admission or admission to hospital is becoming an important metric for quality and efficiency of healthcare. Lumbar spinal fusions have traditionally been performed in an inpatient setting at hospitals, but are recently moving to the outpatient arena. Recently published studies show extremely high rates of hospital readmission after elective spinal fusion surgery. We present data that strongly suggests that TLIF spinal fusions can be performed safely in the setting of an Ambulatory Surgical Center.

**Methods:** A retrospective study was performed on 50 consecutive patients undergoing lumbar TLIF spinal fusions; all of which were performed at the same ambulatory care facility. The surgeries were performed by the same two board certified spine surgeons. Patient follow-ups vary from one to seven years. Numerous data points were obtained from the perioperative and postoperative period which included narcotic use, time to ambulation, hospital readmission, wound infection or wound problems, neurologic injury, pedicle screw adjustment, and Deep Vein Thrombosis (DVT).

### **Surgical Technique:**

A 1 or 2 inch longitudinal paraspinā incision was made approximately two finger breadths lateral to the midline at the index level. The dorsolumbar fascia was incised longitudinally. Blunt dissection in the intermuscular plane, utilizing a typical Wiltse approach. The transverse processes of the operative level and the facet joint were identified. Simultaneously Nuvasive self-retaining retractor was opened in the cephalocaudal and mediolateral fashion, gaining optimal access to the transverse processes, intertransverse membrane and lateral aspect of the intervening facet joint. Once the operative level has been confirmed and meticulous hemostasis was obtained using direct visualization, standard anatomic landmarks, fluoroscopic imaging and neurologic monitoring; pedicle screws were placed into the operative levels. The inter transverse membrane was reflected back off the transverse processes. Following pedicle screw placement a partial facetectomy from a lateral approach is performed using spinal chisels and the Midas Rex high-speed turbine. The exiting nerve root was identified, packed off with sterile half and half cottonoids. Cephalad and caudal to the disc space both pedicles were identified and probed, the disc space was then identified in the standard fashion. Discectomy was then initiated and completed using standard discectomy instruments. Endplate preparation was then completed and after appropriate sizing either a peek cage or structural allograft implant was inserted into the disc space total of two interbody implants per level. After completion of the interbody fusion, the transverse processes were decorticated and a posterior lateral fusion was performed at the operative level as well. The lateral aspect of the dura and the exiting nerve was padded with autogenous fat prior to wound closure, then the fixation rod is attached to the pedicle screws and locked in place. Unilateral interal

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fixation was utilized in all 50 cases. Pulse lavage irrigation utilized in all cases followed by hemovac placement prior to wound closure. All drains removed prior to discharge.

### Data:

Demographics		Number of Patients	Percentage (%)
<b>Age</b>	<35	8	16
	35-54	25	50
	55-74	17	34
	>75	0	0
<b>Sex</b>	Male	25	50
	Female	25	50
<b>Smokers</b>	Non Smoker	39	78
	Ex-Smoker	4	8
	Current	7	14
<b>Comorbidities</b>	CAD	1	2
	Hypertension	15	30
	Diabetes	1	2
	Sleep Apnea	2	4
	Heart Palpitations	2	4
	Stroke History	1	2
	PE History	1	2
	Restless Leg Syndrome	1	2
	Hyperlipidemia	3	6
	Hypothyroid	3	6
	Acid Reflux	2	4
	Asthma	4	8
	Depression	2	4
	Migraines	1	2
	Lyme Carditis	1	2
<b>Complications</b>	Neurological Complications	0	0
	Urinary Tract Infection	0	0
	CSF Leak	0	0
	Deep Venous Thrombosis	0	0
	Pulmonary Embolism	0	0
	Wound Complications	0	0
	Cardiac Complications	0	0
	Respiratory Complications	0	0
Wound Infections	0	0	

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<b><u>Length of Stay</u></b>	Less than 24 hours	50	100
	More than 24 hours	0	0
<b><u>Discharge Disposition</u></b>	Home	47	94
	Acute Rehabilitation Center	3	6
	Hospital	0	0
<b><u>Readmission to hospital or ER</u></b>	Overall Readmission	0	0
	Surgery for infections/wound	0	0
<b><u>Post Op Narcotic Use 6 Months Out</u></b>	None	48	96
	Vicodin	1	2
	Percocet (not long term)	1	2

One Level Fusion Heal Rate	100%
Two Level Fusion Heal Rate	92%
Average Length of Stay (hours)	17.32
Time to Ambulation (hours)	3.75
Average Blood Loss (cc)	120.42
Blood Transfusions	0

**Results:** Of the 50 patient's in the study, no patients were admitted to the hospital subsequent to the surgery and no return to OR either in Ambulatory Surgical Center or hospital. There were no postoperative infections and no deep vein thrombosis. There were no neurologic injuries and no transfusions required. Three patients were admitted to sub-acute rehabilitation for a 24-hour stay. 100% of the patients were discharged in less than 24. The average length of stay was 17.32 hours and the average time to ambulation was 3.75 hours. There was a 92% overall fusion rate and a 100% fusion rate for single level surgeries. 14% of the patients were smokers and only two of the patients were on narcotic medications 6 months post-op. *THESE PATIENTS HAVE BEEN FOLLOWED 2010 - 2020*

**Conclusions:** These studies results contrasts dramatically with the recently published article by Baaj et al 42:22 1706-1716 in The Spine Journal which showed that 24.8% of hospital based patients undergoing a spinal fusion were readmitted into a hospital setting within 90 days. This was a 10 year analysis of the state wide cohort in the state of New York. Our study shows that TLIF lumbar fusions can be performed

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safely, efficaciously, economically, and with a high rate of patient satisfaction. There were no hospital admissions within 90 days. Post-operative transfers to rehabilitation facilities were minimal. There were no neurologic injuries or subsequent surgeries requiring screw revision. This study was conducted over a 7 year period of time. This study suggests patients can be effectively selected to undergo outpatient lumbar spinal fusion surgery with excellent safety and excellent outcomes. The cost savings are compelling at numerous levels. Significant savings are realized including decreased cost of hardware by utilizing unilateral internal fixation when indicated; and realized from lack of admission to rehabilitation facilities and savings from decreased hospital stays and decreased hospital readmissions.

**Discussion:** A retrospective review of 50 consecutive outpatient lumbar spinal fusions was performed at our ambulatory surgical facility. All surgeries were performed by the two same surgeons' and all of the surgeries were performed at the same Ambulatory Surgical Center since 2010. There is a follow-up from between one and seven years. The surgeries were one or two level TLIF procedures. All procedures utilized unilateral internal fixation. All procedures used structural allograft and local autogenous bone. All procedures utilized intraoperative monitoring. All surgeries were discharged from the center in less than 23 hours.

A detailed analysis conducted as to safety, complications, return to OR, and hospital admissions, as well as inpatient rehabilitation.

Results show that TLIF procedures can be performed safely with high patient satisfaction rate and at a reproducible basis. Cost analysis shows that lumbar fusions can be performed in an Ambulatory Surgical Center with significant cost savings compared to hospital setting.

Cost savings occur at multiple levels and variables:

1. Facility costs decreased by utilization of unilateral internal fixation when indicated and outpatient
2. Decreased use of inpatient consulting services and ancillaries including rehabilitation physical therapy, pain management, pathology, and radiology services.
3. Decreased number of hospital inpatient days
4. Markedly diminished transfers to inpatient rehabilitation facilities COST 10 - 20,000
5. Lower complication rates, particularly requiring hospital readmission;
  - A. Infection: Estimated to cost \$200,000
  - B. Screw revision. Estimated to cost up to \$100,000
  - C. DVT/PE. Estimated cost \$150,000
  - D. Dural repair. Estimated to cost \$50,000

We believe that through careful patient selection, attention to detail during the surgical and perioperative period, that lumbar spinal fusions can be performed reproducibly, safely, and with great economic savings when compared to those procedures performed in an inpatient hospital setting.

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