

# Validation of Freehand Pedicle Screw Technique in a Deformity Trained Spine Surgeon Within the First Two Years of Practice

Maxon Bassett BS<sup>1</sup>, Patrick Young MD<sup>2</sup>, Richard Menger MD MPA<sup>3, 4</sup>

<sup>1</sup>University of South Alabama Medical School, Mobile AL

<sup>2</sup>Department of Orthopedic Surgery, University of South Alabama, Mobile AL

<sup>3</sup>Department of Neurosurgery, University of South Alabama, Mobile AL

<sup>4</sup> Department of Political Science, University of South Alabama, Mobile AL

## **Introduction:**

Enabling technologies such as navigation and robotics have dominated the spine surgery literature regarding the placement of pedicle screws. Arguments surrounding navigation and robotics are secondary to concerns regarding the safety and accuracy of freehand pedicle screw placement. Previous studies regarding the safety of freehand pedicle screws were traditionally in experienced master surgeons. Here we illustrate the technical safety of freehand pedicle screw placement of a spine deformity surgeon within the first two years of practice.

## **Methods:**

Consecutive cases from a single surgeon within a single institution were investigated over a two-year period. Demographic patient information, number of screws, and screw location were recorded from the medical record, operative note, and x-ray respectively. C1 and C2 instrumentation were also included.

## **Results:**

There were a total of 265 surgeries involving the placement of pedicle screws. The average patient age was 52 years old with 55.5% male. Average blood loss was 411cc.

From these 265 surgeries there were 1824 total pedicle screws counted: 9.19% cervical, 38.34% thoracic, 39.93% lumbar, 7.10% S1, and 6.22% pelvic. There were only 2 specific technical symptomatic technical complications throughout the entirety of the 2-year span reviewed which leads to a 0.75% technical complication rate.

Complication patient one was an inferior breach in a grade III spondylolisthesis case resulting in L5 radiculopathy. The second case was on iliac instrumentation in the setting of previous anterior pelvic instrumentation failure. Pelvic instrumentation resulted in impingement on L5. Both required revision with operative improvement.

Location	Number	Percent
c1	37	3.81
c2	65	6.69
c3	0	0
c4	3	0.31
c5	3	0.31
c6	5	0.51
c7	46	4.74
t1	61	6.28
t2	59	6.08
t3	42	4.33
t4	47	4.84
t5	42	4.33
t6	37	3.81
t7	48	4.94
t8	48	4.94
t9	48	4.94
t10	81	8.34
t11	93	9.58
t12	87	8.96
l1	100	10.3
l2	123	12.67
l3	168	17.3
l4	172	17.71
l5	167	17.2
s1	129	13.29
pelvic	113	11.64
Total	1824	100

Location	Number	Percent
Cervical	159	8.72
Thoracic	693	38
Lumbar	730	40.02
S1	129	7.07
Pelvic	113	6.2
Total	1824	100

**Discussion:**

The literature supports technical complication rates in navigated screws from 0-6.8% with a leading meta-analysis showing a 1.13% complication rate. Freehand screws by a deformity trained surgeon within the first two years of practice falls within this range. Freehand pedicle screw technique is still a viable method in an era demanding value-based healthcare