Plastic multilayered closure versus orthopedic surgeon closure after spinal instrumentation in pediatric neuromuscular scoliosis

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BACKGROUND

Spinal fusion for neuromuscular scoliosis has a higher documented post-operative complication rate than adolescent idiopathic scoliosis. Comparisons of wound complications after posterior spinal fusion for neuromuscular scoliosis between an orthopedic surgical team performing a wound closure versus a plastic surgical team with a plastic multilayered closure (PMC) technique is not well described in literature.

PURPOSE

The purpose of this study was to compare the wound complication rate between an orthopedic closure (OC) and PMC of the surgical incision in patients undergoing primary posterior spinal fusion for neuromuscular scoliosis in a single center tertiary children's hospital.

METHODS

We conducted a retrospective analysis of data collected on patients aged 3 to 18 years or younger with a diagnosis of neuromuscular scoliosis who underwent first time spinal instrumentation between January 1, 2018 and May 31, 2021. Exclusion criteria included idiopathic scoliosis, revision surgery for scoliosis, surgery for causes other than neuromuscular scoliosis, and surgical approach from a site other than the back. PMC became the norm at our institution in July 2019, there were five PMC's before this date, and one OC after this date in our dataset. Patient demographics, length of surgery, spinal levels fused and operative variables, wound complication rate, treatments, and need for wound washout were reviewed in depth and recorded. Complications and reoperations within 90 days were recorded, including the indication for reoperation..

	OC mean ± SD (n=46)	PMC mean ± SD (n=40)	P
Age (years)	12.4 ± 2.46	12.2 ± 2.8	0.711
Sex	19 male 27 female	17 male 23 female	1.00
Race	18 white 16 Hispanic/latino 8 black 4 Asian	23 white 10 Hispanic/latino 6 black 1 Asian	0.298
BMI	21.2 ± 5.7	19.9 ± 5.0	0.263
Primary Diagnosis	28 cerebral palsy 14 other 2 muscular dystrophy 2 SMA	19 cerebral palsy 11 other 5 muscular dystrophy 5 SMA	0.235
Operating Room time (hours)	6.7 ± 1.2	7.3 ± 1.3	**0.016**
Spinal levels fused	15.5 ± 1.4	15.1 ± 2.5	0.309
Estimated blood loss (ml)	864 ± 547	710.5 ± 645.4	0.237
pRBC transfused (ml)	342 ± 318	258.5 ± 428.3	0.301
Cell Saver (ml)	311 ± 240	256.9 ± 296.3	0.359
Length of Stay (days)	9.8 ± 10.1	10.7 ± 9.3	0.687

Table 1. Demographics and index surgery.

	OC mean +/- %/SD	PMC mean ± %/SD	P
Complication rate	10 (20.8%)	5 (12.5%)	0.394
Average post-operative day of complication	38.3 ± 27.1	32.2 ± 17.6	0.659
Unplanned return to OR	6 (12.5%)	2 (5%)	0.275
Patients going home with a drain	1 (2.1%)	6 (15%)	**0.046**

Table 2. Wound complications and reoperations

Figure 1. Superficial wound dehiscence in a 12 year old male 120 days after orthopedic closure

RESULTS

A total of 86 patients were reviewed, 46 with orthopedic closure and 40 with PMC. There was no statistical difference between the cohorts in age, sex, race, BMI, or primary diagnosis. For index surgery there was also no difference in spinal levels fused, estimated blood loss, pRBC transfused, and cell saver volume. There was an increase in operating room time with PMC compared to orthopedic closures (6.7±1.2 vs 7.3±1.3, p<0.016).
There were 15 wound complications for the entire cohort (17.4%). There was no difference in complication rate (20.8% vs 12.5%, p=0.394), mean postoperative day of complication (38.3±27.1 versus 32.2±17.6, p=0.659) or unplanned return to the OR (12.5% versus 5%, p =0.275) for OC and PMC respectively. There was a significant increase in the number of patients going home with a drain in the PMC cohort compared to the OC cohort (2.1% vs 15%, p=0.046).
There was no difference in BMI of patients with no wound complications compared to patients with complications (20.7 ± 6.1 versus 20.5 ± 5.8, p=0.45). There was also no difference in BMI of patients who had at least 1 complication (20.3 ± 6.5 versus 21.6 ± 5.7 p=0.34) for OC and PMC respectively.

CONCLUSION

PMC demonstrated longer operating room times than OC and did not demonstrate a statistically significant reduction of wound complications or unplanned returns to the operating room, but there was a trend toward that outcome that did not reach clinical significance. However, other studies have demonstrated statistical and clinical significance with these variables. Surgical programs should review internal patient volumes and outcomes for spinal fusion in NMS patients and consider if PMC after spinal fusions in pediatric patients with NMS or other scoliosis subtypes is an appropriate option in their institution to minimize post-op wound complications.