

Spinal Decompression in Achondroplastic Patients Using High-speed Drill Versus Ultrasonic Bone Curette: Technical Note and Outcomes in 24 Cases

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Introduction

Due to the anatomical complexities of the achondroplastic spine, surgical management of congenital spinal stenosis is often challenging. The purpose of this study is describe the clinical and operative characteristics of achondroplastic children undergoing multi-level thoraco-lumbar decompressions using either the high-speed drill or the ultrasonic bone curette (BoneScalpel[™]).

Methods

We retrospectively reviewed 24 thoraco-lumbar decompressions in achondroplastic patients at a single institution between 2008 and 2012. Patients were classified into either the high-speed drill cohort or the BoneScalpel[™] cohort, depending on which instrument was utilized to perform the decompression. A technical note on the role of the ultrasonic bone curette in decompressing stenotic achondroplastic spines is also provided.

	High-speed drill cohort			Bon	eScalpel cohort	
Findings	Preoperative Indications (n = 18)	Postoperative Conditions (n = 18)	P ^a	Preoperative Indications (n = 8)	Postoperative Conditions (n = 8)	P ^a
Sensory Disturbances ^b	9/18 (50.0%)	2/18 (11.1%)	0.0233	3/9 (33.3%)	3/9 (33.3%)	1.0000
Back pain	6/18 (33.3%)	1/18 (5.5%)	0.0736	2/9 (22.2%)	0/9 (0.0%)	0.479
Incontinence	5/18 (27.7%)	1/18 (5.5%)	0.1336	1/9 (11.1%)	1/9 (11.1%)	0.479
Neurogenic Claudication	5/18 (27.7%)	0/18 (0.0%)	0.0736	5/9 (55.6%)	0/9 (0.0%)	0.0736
Radiculopathy	3/18 (16.7%)	1/18 (5.5%)	0.4795	0/9 (0.0%)	0/9 (0.0%)	
Ataxia	4/18 (22.2%)	3/18 (16.7%)	1.0000	5/9 (55.6%)	2/9 (22.2%)	0.3711
Weakness	4/18 (22.2%)	1/18 (5.5%)	0.2482	2/9 (22.2%)	0/9 (0.0%)	0.479

Table 2. Complications in	the High-Speed Drill C	ohort vs BoneScalpel	Cohort
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Complication	High-Speed Drill	BoneScalpel	P^{a}
Durotomy (intra-operative)	8/18 (44.4%)	1/9 (11.1%) ^b	0.1925
CSF Leak (post-operative)	2/18 (11.1%)	0/9(0.0%)	0.5385
Pseudomeningoceles	1/18 (5.5%)	0/9 (0.0%)	1.0000
Fever	3/18 (16.7%)	0/9 (0.0%)	0.5292
Wound Infection	2/18 (11.1%)	0/9 (0.0%)	0.5385
Wound Dehiscence	1/18 (5.5%)	0/9 (0.0%)	1.0000
Total Number Patients with at least 1 Complication	10/18 (55.5%)	1/9 (11.1%)	0.0417

Results

In comparison to the high-speed drill cohort, the BoneScalpel[™] cohort experienced less overall perioperative complications, including durotomy, CSF leak, pseudomeningoceles, fever, wound infection, and wound dehiscence, which approached but did not reach statistical significance (p = 0.1660). While 44.4% of patients experienced a durotomy in the high-speed drill cohort, only 16.7% of patients experienced a durotomy in the BoneScalpel[™] cohort (p=0.3509). In the high-speed drill cohort, the number of patients complaining of sensory disturbances, back pain, ataxia, incontinence, neurogenic claudication, radiculopathy, ataxia, and/or weakness decreased post-operatively. Similar results were seen in the BoneScalpel[™] cohort with the exception of sensory disturbances, where two patients developed new-onset paresthesias.

Conclusions

Although spinal decompression provides symptomatic resolution in patients with achondroplasia, intra-operative complications in general and durotomies in particular are not uncommon. In one of the first studies reported on the role of the BoneScalpel[™] in achondroplasia, we report a decreased incidence in intra-operative durotomy and overall peri-operative complication rates in the BoneScalpel[™] cohort, although this did not reach the level of statistical significance. Nonetheless, the data demonstrates that the BoneScalpel[™] is a safe and efficacious alternative to the high-speed drill in these challenging patients.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Discuss the role of the ultrasonic bone curette in spinal decompression; 2) Compare the ultrasonic bone curette to the conventional high speed drill in spinal decompression.

References

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