Bone-only Chiari Decompression Failure Rate is no Different than that of Open Duraplasty

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Learning Objectives

To determine if there is a difference in failure rates between a bone only posterior fossa decompression compared to a duraplasty in treatment of Chiari 1 malformations and if there are any preoperative characteristics that would place patients at higher risk for failure.

Introduction

Despite being a common pathology, there is significant controversy surrounding the optimal surgical approach to Chiari type I decompression. Operative techniques include a bone only posterior fossa decompression or a posterior fossa decompression with duraplasty which is associated with higher morbidity and post operative complications with an unclear reduction in operative failures. An assessment of long-term outcomes, specifically looking at failure rates, and associated factors, for bone-only decompressions versus duraplasty was undertaken to determine superiority in operative managment and if it is necessary or not to open the dura.

Methods

A retrospective review of a prospectively maintained database of all patients undergoing a Chiari decompression at Children's National Medical Center from 1996 to 2014 was performed. All patients who required an additional Chiari decompression for worsening symptoms or persistent syringomyelia were identified (IRB #Pro268). Preoperative symptoms, imaging studies, operative reports and post-operative follow up were available for all included patients.

Results

Nineteen patients out of a total of 195 patients required a second Chiari decompression surgery for a reoperation rate of 9.7%. The average age at the initial surgery was 9.4 years (range 1-17 years) and 10.3 years (range 3-20 years) for the second surgery. Length of time between surgeries was 2.8 years (range 4 months to 8 years) with an average follow up of 47 months (range 1 to 224 months). Of the 70 patients who underwent a bone only decompression, 10 (14%) demonstrated a need for an additional Chiari surgery whereas 9 patients of the 125 (7%) patients who had duraplasty required a second operation (OR: 2.14, CI: 0.82-5.571, p=0.11). Subgroup analysis of patients with any syrinx or holocord syrinx found similar failure rates (OR:2.04,CI:0.577-7.21,p=0.26 and OR:2,CI:0.43-9.2,p=0.36, respetively). Causes of surgical failure found at time of reoperation include inadequate bony decompression in 2/19, bone regrowth 3/19 and arachnoid scarring at 4th ventricular outflow in 17/19 patients, with 10/19(53%) requiring placement of 4th ventricular stent. Complications were seen in 2/70(3%) for bone-only decompression versus 44/169 (26%) with 14 patients having a CSF leak, 26 developing a pseudomeningocele, and 4 developing meningitis (p<0.001).

Outcomes

	Initial Surgery	Did not require revision	Required Revision	p-value
ALL PATIENTS	Bone only decompression	60	10	
	Duraplasty	116	9	0.11
ANY SYRINX	Bone only decompression	29	5	
	Duraplasty	71	6	0.26
HOLOCORD SYRINX	Bone only decompression	14	4	
	Duraplasty	28	4	0.36

Conclusions

Comparison of Chiari failures does not appear to differentiate between open and closed decompression. The most common cause of failure was the presence of arachnoid scaring at the 4th ventricular outflow in both surgical cohorts. The morbidity was significantly higher in the duraplasty cohort compared to the bone only decompression group.

Factors Associated with Surgical Failure

	Number	Percentage
Inadequate bony decompression	2	11
Arachnoid scarring	17	89
Total	19	100

Complications

Surgery	Complication	Number (%)
Bone only decompression	superficial wound infection	2 (3%)
Duraplasty	Pseudomeningocele	26 (15%)
	CSF leak	14 (8%)
	Meningitis	4 (2%)