

**ASSESSMENT OF SURGICAL OUTCOMES OF CHIARI MALFORMATION TYPE ONE WITH  
CHICAGO CHIARI OUTCOME SCALE  
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**Introduction.** Chiari malformation is congenital anomaly that is characterized by downward displacement of cerebellar tonsils and medulla below the foramen magnum and small posterior fossa resulting in brain stem compression and leading to development of syringomyelia in 30-70% cases [7, 8, 9]. Despite its development process CM-I reasons are unclear. However, it might occur during fetal development, such as due to genetic mutations or insufficiency of any important ingredients of maternal diet like lacked certain nutrients, the intending bony space at the base of skull is abnormally small. Progression of pontine flexure during 28<sup>th</sup> and 29<sup>th</sup> day of gestation or imbalance between pulsating choroid plexus of forth and lateral ventricles can also lead to Chiari malformation [12, 13, 14] Key points of MRI finding is >5 mm tonsillar herniation below foramen magnum. The most common symptoms of CM-I are neck pain and headache but almost 80% patients may have visual symptoms [5,6] and other like vomiting, cerebellar ataxia, decreased pain and temperature sensation. The mainstay treatment for this condition is surgery where foramen magnum decompression with or without duraplasty followed by C1 laminectomy performed [10, 11]. However, assessment of surgical outcomes of patients with Chiari malformation I (CM-I) had become huge dilemma due to deficiency of validated assessment measures by the development of novel scoring methods so called Chicago Chiari Outcome Scale (CCOS) (table 1) which gave great opportunity to evaluate result of surgery and earned its fame in the USA.

**The objective** of this study is to evaluate surgical outcomes of Chiari malformation type one using Chicago Chiari Outcome Scale in our practice.

**Materials and methods.** Study was conducted on reviewing of 29 patients that underwent surgical intervention at Republican Specialized Scientific Practical Medical Center of Neurosurgery (RSSPMCN) in Tashkent, Uzbekistan from 2017 to 2018. All patients contact details were collected when they were in our hospital. Detailed explanation about this study was given to them and for this purpose we used CCOS. According to this, 4 main categories such as 1) pain symptoms, 2) non-pain symptoms, 3) functionality and 4) complications were analyzed by making either phone call or face to face contact after 0-3 months from surgery and 1-4 score is given to each abovementioned categories and total score is 4-16. Total score of 4 meant incapacitated outcome, 4-8, 9-12, 13-16 scores meant impaired outcome, functional outcome, excellent outcome respectively.

*Table 1. Chicago Chiari Outcome Scale*

<b>Pain</b>	<b>Non-pain</b>	<b>Functionality</b>	<b>complications</b>	<b>Total score.</b>
1-pre-operative symptom worse	1-pre-operative symptom worse	1-Unable to attend	1-persistent complication-poorly controlled	4-incapacitated outcome
2-unchanged/refractory to meds/onset of new poorly managed symptoms	2-unchanged/improved but impaired/ onset of new poorly managed symptoms.	2-moderate impairment (<50% attendance)	2-persistent complication-well controlled	8-impaired outcome
3-improved/managed with meds/onset of new symptoms managed with meds	3-improved-unimpaired/onset of new symptoms managed with meds	3-mild impairment (>50% attendance)	3-transient complication	12-functional outcome
4-resolved/no onset of new symptoms	4-resolved/no onset of new symptoms	4-fully functional	4-uncomplicated course	16-excellent outcome

**Results.** Surgical outcomes of all patients who underwent surgical intervention varied from worse to excellent outcome (10% to almost 70%). There was 1:3,33 male-to-female ratio and mean age remained 35,5 with the oldest patients aged 60 whereas there was 9 year old girl. In addition to this, 27,6 % patient aged 30-40 in contrast to 2 pediatric case. The most important point is that 17,24% of all cases had other disorders such as chronic rhinitis, obesity, hepatitis C (n=1) and secondary trigeminal neuralgia (3,44%). However, in 46% cases there was CM I associated with syringomyelia where 60% of them underwent foramen magnum decompression along with duraplasty. In 16 cases we performed foramen magnum decompression followed by duraplasty and 12,5% of them showed poor results whereas 25,8% case of foramen magnum decompression without duraplasty remained almost unchanged after surgery. According to results regarding CCOS used, 10,34% patient showed worse outcome that characterized by acute disturbance of cerebral circulation by hemorrhagic type and intraoperative development of bradycardia during resection of cerebellar tonsils and single mortality case of patient because of respiratory center lesion after reoperation in which cerebellar tonsils resection was performed. 6,8% patients had an impaired outcomes when 17,24% patients showed functional outcome. 65,6% had an excellent outcome characterized by being completely functional and not having new symptoms with completely preoperative symptoms regress.

**Discussion.** Yarbrough et al studied 292 cases at Saint Louis Children's Hospital (SLCH) over a 12-year period from 2001–2012 and assessed results of surgery for Chiari malformation type one using CCOS. According to their report 67% patient had improved gestalt score after surgery [1]. Woon Tak Yuh et al suggest that migration of medulla oblongata did not influence on surgical outcome when cistern magna was restored. In their study they compared surgical outcomes of 38 patients who underwent foramen magnum decompression and duraplasty and there adult idiopathic Chiari malformation type one compared with type 1.5. [2]. Similar study of was performed by Chen et al in the Neurosurgery Department of Peaking Union Medical College Hospital from 2008 to 2014. They assessed clinical outcomes at the 1 month and 1 year follow-up visits based on the following criteria: excellent results,

improvement of the neurological deficit; good result, cessation of progression of the neurological deficit; and poor result, further deterioration of neurological function

patients were older than 18 years of age [3]. They experienced excellent result in 72 cases among 103 patients during 1 month follow-up visit while 63 excellent outcome in long-term follow-up period. However, 50 % of 12 CM-I associated with SM patients had improved outcomes after surgery assessed by Mário Augusto Taricco and Luiz Ricardo Santiago Melo in 2008 [4].

**Conclusion.** Based on study performed, it can be concluded that Chicago Chiari Outcome Scale was an effective to differ and assess the results of surgery because of its benefits like identifying patients with significant improvement or with impaired outcomes. In addition to this, it was also easy way to patients that show an importance of interaction between patient and physicians. Moreover, it helps to acknowledge the superiority of foramen magnum decompression along with duraplasty from only decompressive surgery of craniovertebral junction.

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