Management of TCs

Numerous techniques for the management of TCs have been described in the literature, with variable results. Tarlov, in his seminal series, removed the domes of the cysts or completely excised the lesions along with the dorsal root ganglion. Paulsen et al.30 reported that patients who underwent sacral meningeal cyst aspiration tended to accumulate CSF and become symptomatic in 3 weeks to 6 months. Patel et al.29 proposed that the injection of a sealant into the cyst would thicken the wall of the cyst via fibrosis and block the one-way valve at the neck of the cyst, reducing the entry of CSF and thereby preventing the cyst from distending and compressing local nerves. It has been proven that fibrin glue injection into a sacral meningeal cyst may be a definitive therapy. Murphy et al.23 reported the largest series of patients (n = 213) treated with CT-guided cyst aspiration and fibrin glue using single- and double-needle techniques, whereas Jiang et al.17 utilized C-arm fluoroscopy-guided cyst aspiration. Bartels and van Overbeeke5 described external CSF drainage with LP shunt placement. Voyadzis et al.,29 Guo et al.,38 Tanaka et al.,26 and Neulen et al.26 suggested that surgical treatment is indicated for cysts larger than 1–1.5 cm in size presenting with radicular symptoms, and is strongly correlated with excellent clinical outcome. Langdown et al.19 found that it is not the size of the cyst per se but its proximity to the nerve root and the presence of a valve mechanism within the cyst that predict the development and progression of symptoms. Acosta et al.2 and Mummaneni et al.32 observed that patients who present with pain (exacerbated by both postural changes and Valsalva maneuvers) but not with urinary dysfunction are likely to benefit most from surgery. Burke et al.6 performed a meta-analysis of microsurgically treated TCs and showed that advanced age, a large number of cysts, and duration of preoperative symptoms were associated with poor postoperative outcomes. These authors also defined the criteria that can be used to guide the surgical decision-making process in treating these patients.

Our extensive literature review and meta-analysis of all the available cases of symptomatic TCs suggests that surgical procedures are superior to percutaneous interventions in terms of symptom resolution and long-term patient-reported outcomes.

Variability in Open Surgical Techniques for TCs

A variety of surgical techniques have been described in managing patients with TCs in various series by different authors and even within series by the same authors (Table 1). In the largest series to date (n = 38), Sun et al.42 reported no cyst recurrence at a mean follow-up of 21 months in their series after performing a partial resection of the cyst, ligation of the cyst neck, over-sewing, cyst coagulation, and using a local muscle flap for obliteration of the cyst. Delayed wound healing (n = 2) and wound infection requiring debridement and suturing (n = 5) were the reported complications in their series. In contrast, the authors of another series using a similar surgical technique (microsurgical cyst fenestration and vascularized muscle pedicle flap insertion for complete closure of cyst wall [n = 7], incomplete closure of the cyst wall without a watertight seal [n = 5], no attempt at closure of cyst wall [n = 22], and no fenestration of the cyst [n = 1]) reported cyst recurrence in 19 of 35 patients at a mean follow-up of 8 months.31 Similarly, Burke et al.6 (n = 23) have described a technique of cyst incision followed by autologous muscle patching to augment dural closure, and cyst recurrence was noted in only one patient. Zheng et al.53 described the use of a balloon-assisted fistula-sealing procedure for high-flow cysts (n = 18) and cyst imbrication for low-flow cysts (n = 4). Fibrin glue for sealing the cyst has been consistently described in a variety of studies with variable success.11,27,28,34,38,49 In 2014, Takemori et al.44 described using a cyst-subarachnoid shunt in 2 patients with TCs; they found no complications or recurrence at 54 months’ follow-up. Also, the use of lumbar drain or LP shunt has been inconsistently described in the literature.
Mummaneni et al.22 (n = 8) and Caspar et al.9 (n = 15) used a postprocedural lumbar drain in patients with TCs and observed no complications (Table 1). Overall, there is wide inter- and intra-variability among the surgical procedures performed in these studies. Therefore, it was not possible to compare and establish the superiority of one surgical procedure over another.

Clinical Decision-Making in Patients With TCs

Based on our analyses, surgical procedures can be chosen for younger, healthy patients with better long-term cyst resolution but with increased risk of postprocedural complications. Percutaneous techniques can be considered in elderly patients with multiple medical morbidities who are otherwise not fit to undergo surgical procedures involving general anesthesia and who cannot withstand postprocedural complications. The choices regarding different surgical procedures cannot be concluded based on our analyses, given the heterogeneity of reported retrospective surgical series and the low number of patients. This decision-making must involve patients’ perspectives and choices in an informed manner.

Limitations

Our meta-analysis was limited by the variability in the available articles due to the reporting bias of included retrospective studies and institutional/operational protocols. Also, the size of cysts was inconsistently reported across the studies (group A, 17 studies [n = 220]; group B, 1 study [n = 5]), which limited our ability to assess the impact of cyst size on clinical presentation and outcomes. No clearcut imaging protocols were mentioned across the different studies to determine cyst recurrence. Each study had patient-reported outcomes per the study site protocols and could not be unified using a validated pain scale disability rating. However, to the best of our ability, the studied parameters were standardized, and variables that were not explicitly reported were excluded from the analysis. Also, the low incidence of TCs limits the statistical analysis and firm conclusions that can be drawn from this study. Therefore, given the heterogeneous nature of the patient populations and the variable cyst sizes, the multitude of procedures, and the variable clinical follow-up, it is critical to interpret these results with caution. This is by far the largest seminal study comparing outcomes in symptomatic TCs managed using surgical and percutaneous techniques.

Conclusions

Our comparative outcome analysis of symptomatic TCs treated with surgical or percutaneous interventions suggests that, although the surgical interventions were associated with higher postprocedural complication rates, the long-term efficacy and success in terms of cyst resolution (no difference in recurrence of symptoms) were superior following surgery rather than following percutaneous techniques in patients with symptomatic TCs. These results can guide clinicians in decision-making while managing these patients with this complicated clinical condition.

References


Disclosures
The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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Conception and design: Sharma, Dietz. Acquisition of data: Sharma, SirDeshpande, Dietz. Analysis and interpretation of data: Boakye, Sharma, SirDeshpande. Critically revising the article: SirDeshpande, Ugiliweneza. Drafting the article: Boakye, Sharma, SirDeshpande. Conception and design: Sharma, Dietz. Acquisition of data: Sharma, SirDeshpande, Dietz. Analysis and interpretation of data: Boakye, Sharma, SirDeshpande. Writing the article: Boakye, Sharma, SirDeshpande, Dietz. The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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