Tubular Retractor System

BrainPath endoport system (NICO, Indianapolis, Indiana)

ViewSite Brain Access System (Vycor Medical, Boca Raton, Florida)

see Tubular Retractor System in Spine Surgery

Indications

Transpsoas approach and retractor placement is achieved using sequential tubular dilators that are placed under the guidance of fluoroscopic imaging (or navigation) and using directional EMG monitoring (NeurovisionTM, NuVasive, San Diego, CA) allowing the dilator placed anterior to the main lumbar plexus.

Eichberg et al., reviewed a single institution's transcortical-transtubular intracranial cavernous malformation resections using either BrainPath (NICO, Indianapolis, Indiana) or ViewSite Brain Access System (Vycor Medical, Boca Raton, Florida) tubular retractors performed from 2013 to 2018 (n = 20).

Gross total resection was achieved in all patients. When a developmental venous anomaly (DVA) was present, avoidance of DVA resection was achieved in all cases (n = 4). All patients had a supratentorial cavernoma with mean depth below cortical surface of 44.1 mm. Average postoperative clinical follow-up was 20.4 wk. Early neurologic deficit rate was 10% (n = 2); permanent neurologic deficit rate was 0%. One patient (5%) experienced early postoperative seizures (< 1 wk postop). No patients experienced late seizures (> 1 wk follow-up). Engel class 1 seizure control at final clinical follow-up was achieved in 87.5% of patients presenting with preoperative epilepsy.

Tubular retractors provide a low-profile, minimally invasive operative corridor for resection of subcortical cavernomas. There were no permanent neurologic complications in our series of 20 cases, and long-term seizure control was achieved in all patients. Thus, tubular retractors appear to be a safe and efficacious tool for resection of subcortical cavernomas [1)].

Posterior fossa tumor surgery is associated with a significant risk of complications, and the complications are typically more frequent than similar supratentorial surgeries. The primary objectives of the present study are to evaluate extent of resection and neurological outcomes and the secondary objective is to evaluate perioperative complications with using minimally invasive approaches for intra-axial posterior fossa tumors from our case series.

All consecutive patients who underwent non-biopsy surgery of a posterior fossa tumor using tubular retractors and exoscopic visualization from January 2016 to May 2018 were prospectively identified and included.

15 patients underwent resection of an intra-axial posterior fossa tumor during the reviewed period. Eight (53%) were male and the median (interquartile range) age was 63.0 (45.0-67.5) years. The

location of the pathology was the cerebellar hemisphere in 11 (73%), vermis in 3 (20%), and middle cerebellar peduncle in 1 (7%). The median pre and postoperative lesion volumes were 21.6 (10.1-33.0) 0 (0-1.2) cm3, respectively. The percent resection was 100% (92-100%). Following surgery, 12 (80%) had improved and 3 (20%) had stable KPS, where no patients had a decline in KPS postoperatively. No patients incurred other postoperative regional or medical complications.

Mampre et al. demonstrated the possible efficacy of a minimally invasive approach with the use of tubular retractors and exoscopic visualization for resecting posterior fossa intra-axial tumors with relatively high efficacy and low morbidity [2].

Case series

Retraction ofwhite matter overlying a brain lesion can be difficult without causing significant trauma especially when using traditional methods of bladed retractors. These conventional retractors can produce regions of focal pressure resulting in contusions and areas of infarct.

Okasha et al. presented a retrospective case series of six patients with deep-seated intraventricular and intraaxial tumors that were approached using a ViewSite Brain Access System (tubular retractor). The authors describe a unique method of creating a pathway using a dilated glove. They also reviewed the relevant literature that reports this type of surgery. Cases included three cases with third ventricular colloid cysts, one case of a third ventricular arachnoid cyst, one case with a lateral ventricular neurocytoma, and a case with a deeply seated intra-axial metastatic tumor.

Gross total resection was achieved in five cases with small residual in the central neurocytoma operation, with no documented neurological deficit in any case. One case had persistent memory problems and one case had continuing decline from the metastatic disease.

The introduction of tubular-shaped retractor systems has offered the advantage of reducing retraction pressures and distributing any remaining force in a more even and larger distributed area, thus reducing the risk of previous associated morbidity while also permitting great visualization of the target lesion [3].

Tubular Retractor System for cerebral arteriovenous malformation surgery

Tubular Retractor System for cerebral arteriovenous malformation surgery

1)
Eichberg DG, Di L, Shah AH, Ivan ME, Komotar RJ, Starke RM. Use of Tubular Retractors for Minimally Invasive Resection of Deep-Seated Cavernomas. Oper Neurosurg (Hagerstown). 2019 Jul 13. pii: opz184. doi: 10.1093/ons/opz184. [Epub ahead of print] PubMed PMID: 31301143.
2)
Mampre D, Bechtle A, Chaichana KL. Minimally invasive resection of intra-axial posterior fossa tumors using tubular retractors. World Neurosurg. 2018 Aug 18. pii: S1878-8750(18)31832-1. doi: 10.1016/j.wneu.2018.08.049. [Epub ahead of print] PubMed PMID: 30130571.
3)
Okasha M, Ineson G, Pesic-Smith J, Surash S. Transcortical Approach to Deep-Seated Intraventricular and Intra-axial Tumors Using a Tubular Retractor System: A Technical Note and Review of the Literature. J Neurol Surg A Cent Eur Neurosurg. 2020 Dec 15. doi: 10.1055/s-0040-1719025. Epub ahead of print. PMID: 33321519.