

**Table 1: Baseline characteristics of the Included studies**

**FROM: Neuroendoscopy in the treatment of intraventricular tumors: A Systematic Review  
and Meta-Analysis**

| Study ID                 | Study design         | Sample size (endoscopy cohort) | Mean age in years | Gender (male/female) | Tumor location                                                                                                                                                                        | Histological type                                                                                                             | Endoscopic approach                                | Gross total resection (GTR) (%) | Subtotal resection rate (%) | Tumor recurrence/progression rate             | Survival rate   |
|--------------------------|----------------------|--------------------------------|-------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------|-----------------------------|-----------------------------------------------|-----------------|
| Samadian et al.,2018     | Retrospective study  | 112                            | 36.2              | (76/36)              | Third ventricle (near foramen of Monro)                                                                                                                                               | Colloid cyst (benign)                                                                                                         | Frontal precoronal burr hole                       | 92% (103/112)                   | 8% (9/112)                  | 3.5% (4/112; all in subtotal resection group) | 98.3% (110/112) |
| Maloumeh et al.,2021     | Retrospective cohort | 10                             | NR                | NR                   | Rostral fourth ventricle                                                                                                                                                              | NR                                                                                                                            | Telovelar approach + adjustable-angle endoscope    | NR                              | 0%                          | 0%                                            | 100%            |
| Verducci et al.,2024     | Retrospective cohort | 36                             | NR                | NR                   | Third ventricle region                                                                                                                                                                | NR                                                                                                                            | Primarily endoscopic endonasal                     | NR                              | NR                          | NR                                            | NR              |
| Torres-Corzo et al.,2018 | Retrospective cohort | 48                             | 20.45 (±18.65 SD) | (25 /23 )            | Thalamus (22.9%), Pineal (20.8%), Sellar (16.6%), Brainstem (12.5%), Cerebellar (10.4%), Fourth ventricle (6.2%), Lateral ventricle (4.1%), Third ventricle (4.1%), Hypothalamus (2%) | Astrocytoma (29.2%), Germinoma (10.4%), Craniopharyngioma (8.3%), Ependymoma (4.2%), Choroid plexus papilloma (4.2%), others  | Flexible neuroendoscopy via Kocher point burr hole | 100% (48/48 patients)           | NR                          | NR                                            | NR              |
| Tawk et al.,2020         | Retrospective cohort | 13                             | 44 ± 16           | (6/7)                | Third ventricle                                                                                                                                                                       | Colloid cyst (8), Craniopharyngioma (1), Subependymal giant cell astrocytoma (1), Anaplastic astrocytoma (1), Metastatic lung | Endoscopic transforaminal transchoroidal (ETTC)    | 54% (7/13)                      | 31% (4/13; "near-complete") | 31% (4/13)                                    | 100%            |

|                         |                                          |                             |             |         |                                                                                              |                                                                                                                             |                                                                               |                                        |                                        |                                                                           |               |
|-------------------------|------------------------------------------|-----------------------------|-------------|---------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|---------------------------------------------------------------------------|---------------|
|                         |                                          |                             |             |         |                                                                                              | adenocarcinoma (1),<br>Lymphoma (1)                                                                                         |                                                                               |                                        |                                        |                                                                           |               |
| Shahrestani et al.,2020 | Retrospective case series                | 6                           | 50.5 ± 14.5 | (2/4)   | Pineal region / posterior third ventricle (all patients)                                     | Pineocytoma (1), metastatic melanoma (1), atypical teratoid/rhabdoid tumor (1), ependymoma (1), epidermoid (1), abscess (1) | Pure endoscopic supracerebellar infratentorial (SCIT)                         | 83.3% (5/6)                            | 16.7% (1/6; near-total resection)      | 0% (no recurrence reported)                                               | 100%          |
| Arnaout et al.,2021     | Retrospective study                      | 12                          | 28.5        | (10/2)  | Retroforaminal third ventricle (all patients)                                                | Colloid cyst (100%)                                                                                                         | Endoscopic transseptal interforniceal                                         | 83.3% (10/12)                          | 16.7% (2/12: 1 near-total, 1 subtotal) | 8.3% (1/12 at 28 months)                                                  | 100%          |
| Greco et al.,2022       | Single-center, retrospective case series | 47 patients (51 procedures) | 9.8 ± 4.6   | (31/16) | Intraventricular (27.6%), Suprasellar (25.5%), Pineal (17.0%), Tectal (6.4%), Frontal (6.4%) | Astrocytoma (29.8%), Craniopharyngioma (27.6%), Germinoma (10.6%), Pineal tumors (8.5%)                                     | Intraventricular (rigid endoscope), Endoscopic endonasal (EEA for skull base) | 88.9% (8/9 cases)                      | 11.1% (1/9 cases)                      | Cyst recurrence : 18.8% (3/16 cyst fenestrations required reintervention) | 100%          |
| Isaacs et al.,2020      | Retrospective case series                | 74                          | 48          | (38/36) | Third ventricle (100%)                                                                       | Colloid cyst (100%)                                                                                                         | Flexible neuroendoscopy via precoronal burr hole                              | 6.8% (5/74;                            | 93.2% (69/74                           | 8.1% (6/74; radiographic recurrence)                                      | 100%          |
| Boogaarts et al.,2011   | Retrospective multicenter case series    | 90                          | 43          | (52/38) | Third ventricle (100%)                                                                       | Colloid cyst (100%)                                                                                                         | Rigid endoscopy (MINOP/Deeg systems) via frontal burr hole                    | 51.3% (41/80 patients; Group A on MRI) | 48.7% (Group B: 6.3% + Group C: 42.5%) | 46.9% (30/64 imaging cohort); Symptomatic reoperation                     | 98.9% (89/90) |

|                        |                                             |    |      |         |                                                                                |                                                                                                                                       |                                                                                    |               |                                                  |                                                |                |
|------------------------|---------------------------------------------|----|------|---------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------|--------------------------------------------------|------------------------------------------------|----------------|
|                        |                                             |    |      |         |                                                                                |                                                                                                                                       |                                                                                    |               |                                                  | n: 6.7%<br>(6/90)                              |                |
| Sankhla et al.,2023    | Retrospective study                         | 26 | 38.5 | (11/15) | Lateral ventricle (100%)                                                       | Central neurocytoma (30.8%), HGG (19.2%), Ependymoma (19.2%), Colloid cyst (11.5%)                                                    | Endoport-assisted transcortical transventricular                                   | 69.2% (18/26) | 19.2% (5/26)                                     | NR                                             | 100%           |
| Eshra et al.,2018      | Case series                                 | 16 | NR   | (4/12)  | Third ventricle                                                                | Colloid cyst                                                                                                                          | Rigid endoscopy (right-sided in all cases)                                         | 75% (12/16)   | 25% (4/16; evacuation + partial capsule removal) | 0% (no recurrences in 1–4 years)               | 100%           |
| Yan et al.,2023        | Retrospective case series                   | 16 | 43.2 | (5/11)  | Lateral ventricle (sub-locations: body, frontal horn, occipital horn, trigone) | Central neurocytoma (5), meningioma (5), diffuse astrocytoma (2), astrocytoma (1), glioblastoma (1), ependymoma (1), colloid cyst (1) | Endoport-assisted neuroendoscopy (trans-frontal cortical/transtemporal approaches) | 88% (14/16)   | 12% (2/16)                                       | 0% (in non-GBM cases; 1 GBM progression)       | 93.75% (15/16) |
| Vorbau et al.,2019     | Retrospective study                         | 20 | NR   | NR      | Third ventricle                                                                | Colloid cyst (100%)                                                                                                                   | Transventricular (burr hole)                                                       | 80% (16/20)   | 15% (3/20; remnants left)                        | 11.1% (2/18; both in subtotal resection cases) | 100%           |
| Dhandapani et al.,2021 | Prospective study (with cross-sectional QOL | 22 | 34   | NR      | Anterior third ventricle                                                       | Colloid cyst (100%)                                                                                                                   | nr                                                                                 | 100% (22/22)  | 0%                                               | NR                                             | NR             |

|                            |                                 |     |             |         |                                                                                           |                                                                                                                                                  |                                                                                |                 |                            |              |               |
|----------------------------|---------------------------------|-----|-------------|---------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------|----------------------------|--------------|---------------|
|                            | assessment)                     |     |             |         |                                                                                           |                                                                                                                                                  |                                                                                |                 |                            |              |               |
| Ibáñez-Botella et al.,2024 | Retrospective descriptive study | 11  | 44          | (6/5)   | Third ventricle (anterior wall near foramen of Monro)                                     | Colloid cyst (100%)                                                                                                                              | Transforminal (73%), transchoroidal (27%)                                      | 91% (10/11)     | 9% (1/11; capsule remnant) | 0            | 100%          |
| Iacoangeli et al.,2014     | Retrospective Case Series       | 5   | 48.6        | (4/1)   | Third ventricle (middle/posterior roof attachment)                                        | Colloid cyst (benign)                                                                                                                            | Combined endoscopic transforminal-transchoroidal approach (ETTA)               | 100% (5/5)      | 0                          | 0            | 100%          |
| Lara-Reyna et al.,2020     | Retrospective cohort study      | 132 | 41.6        | NR      | Third ventricle                                                                           | Colloid cyst (benign)                                                                                                                            |                                                                                | 110/121 (90.9%) | 11/121 (9.1%)*             | 3/121 (2.5%) | 100%          |
| Cinalli et al.,2017        | Case series                     | 12  | 1–15        | (10/2)  | Purely intraventricular (6), intraparaventricular (2), suprasellar/third ventricular (4)  | Medulloblastoma, ATRT, SEGA, immature teratoma, pineal anlage tumor, low-grade glioneuronal tumor, craniopharyngioma, pilocytic astrocytoma      | Precoronal bur hole (9), frontal hairline bur hole (2), occipital/parietal (1) | 9/11 (81.8%)    | 2/11 (18.2%)*              | 2/11 (18.2%) | 100           |
| Ebel et al.,2021           | Retrospective case series       | 8   | 41.7 ± 28.2 | (5/3)   | - Third ventricle (n=3)<br>- Lateral ventricle (n=4)<br>- Thalamic/Foramen of Monro (n=1) | - Colloid cyst (n=3)<br>- Meningioma WHO I (n=2)<br>- Choroid plexus carcinoma (WHO III, n=1)<br>- SEGA (WHO I, n=1)<br>- Low-grade glioma (n=1) | - Frontal (n=5)<br>- Occipital (n=2)<br>- Parietal (n=1)                       | 33.3% (4/12)    | 33.3% (4/12)               | 33.3% (4/12) | 83.3% (10/12) |
| Koutourousiou et al.,2013  | Retrospective cohort            | 64  | 40          | (39/25) | Suprasellar (100%), with sellar extension (60.1%)                                         | Craniopharyngioma                                                                                                                                | Endoscopic endonasal                                                           | 87.5% (7/8)     | 0                          | 0%           | 100%          |

|                             |                                                                        |    |      |         |                                                            |                                                                                                                                                                          |                                                   |               |               |               |               |
|-----------------------------|------------------------------------------------------------------------|----|------|---------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------|---------------|---------------|---------------|
| Margetis et al.,2014        | Retrospective cohort                                                   | 77 | 42.2 | 38/39   | Third ventricle (100%)                                     | Colloid cyst                                                                                                                                                             | Stereotactic precoronal transcavum-interforniceal | 37.5% (24/64) | 62.5% (40/64) | 34.4% (22/64) | 85.9% (55/64) |
| Raouf and Zidan et al.,2015 | Retrospective case series                                              | 90 | 40.3 | (32/58) | Third ventricle (100%)                                     | Colloid cyst                                                                                                                                                             | Single burr hole                                  | 84.4% (65/77) | 15.6% (12/77) | 2.6% (2/77)   | 100%          |
| Ibáñez-Botella et al.2019   | Case series                                                            | 9  | 43.7 | (5/4)   | Lateral ventricle: 5 (55.6%)<br>Third ventricle: 4 (44.4%) | Range: 18–74 years<br>Subependymoma: 3 (33.3%)<br>Colloid cyst: 3 (33.3%)<br>Pilocytic astrocytoma: 1 (11.1%)<br>Epidermoid: 1 (11.1%)<br>Central neurocytoma: 1 (11.1%) | Single-portal endoscopic                          | 87.9% (79/90) | 11% (10/90)   | 0             | 100%          |
| Qiao et al.,2015            | Retrospective case series                                              | 27 | 51.3 | (21/6)  | Third ventricle (100%)                                     | Papillary craniopharyngioma (100%)                                                                                                                                       | Extended endoscopic endonasal approach (EEEA)     | 55.6% (5/9)   | 44.4% (4/9)   | 0             | 100%          |
| Sharifi et al.,2015         | Retrospective (with prospective follow-up for non-hydrocephalus cases) | 71 | NR   | (32/39) | Third ventricle                                            | Colloid cyst                                                                                                                                                             | Frontal burr hole trajectory                      | 88.9% (24/27) | 11.1% (3/27)  | 11.1% (3/27)  | 100%          |