

## Endoscopic Surgery of Third Ventricular Lesions

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### Abstract

**Background:** The endoscopic surgery to third ventricular lesions are now widely used as it is less invasive than the traditional microsurgical procedures.

**Aim of Study:** To evaluate endoscopic surgery of third ventricular lesions as regards clinical improvement, complication rate and extent of lesion resection.

**Patients and Methods:** Retrospectively eleven cases of third ventricular lesions (seven cases of colloid cyst, two cases of astrocytoma, one case epidermoid cyst and 1 case of arachnoid cyst) were operated upon through endoscopic route for total excision if feasible, pre-operative assessment in the form of full neurological examination and imaging (CT and MRI) were done for all patients. Incompletely removed lesions were managed by a septostomy and VP shunt, post-operatively CT was performed in the first 24 hours after surgery and another after 48 hours, MRI with contrast was done 6 months post-operatively to detect recurrence, patients with persistent post-operative hydrocephalus had VP shunt insertion.

**Results:** Complete resection was achieved in nine patients (82%), while resection was incomplete in two cases (18%). complications were in one case (9%) in the form of short memory affection improved after one month, post-operative hydrocephalus was in one patient (9%), mean length of hospital stay was three and half days, no recurrence was reported in all patients with complete resection for a follow-up period of 12 months.

**Conclusion:** Endoscopic resection of third ventricular lesions is safe, minimally invasive, technically feasible and with good outcome especially in completely removed lesions.

**Key Words:** Endoscopic surgery – Third ventricular tumors – Hydrocephalus – ETV.

### Introduction

**TUMORS** involving the third ventricle are not common with low incidence of the total brain tumors which is about 0.6 to 0.9 percent [1-4]. The most common tumor involving the third ventricle in adults is the colloid cyst followed by ependymomas and choroid plexus tumors in children,

other rare pathologies are craniopharyngioma, optic gliomas, pineal region masses and thalamic masses [1-3]. Lesions of the third ventricle are classified according to their location relative to the foramen of Monro into anterior posterior and whole third ventricular lesions, this division is based on their position in relation to the foramen of Monro so that anterior lesions are in front of the foramen of Monro and posterior lesions are behind the foramen of Monro [3-6]. Below five years of age choroid plexus tumors and ependymomas are the predominant pathologies, while in adults colloid cyst is the main pathology and is usually located at the anterior third ventricle [3-6]. There are no definite symptoms defining intraventricular tumors but the most common presenting symptom is headache and other increased tension manifestations due to secondary hydrocephalus [4-6]. The third ventricle is located deeply inside the brain tissue with a complex anatomy of its walls formed by very important structures namely the hypothalamus, the thalamus, the fornix and the optic chiasm, thus this makes surgical approaches and techniques for that region a bit tricky and difficult with a huge challenge for the neurosurgeon [6-8]. The third ventricle is either approached via a transcortical or a transcallosal route either anteriorly or posteriorly with both routes having its merits and disadvantages, but actually the approach itself adds to the morbidity of the overall procedure and sometimes the mortality rate also is a little bit increased [7,8]. So the surgical procedure is risky and difficult regarding both the approach and the surgery itself but after the evolution of intraventricular endoscopic procedure and the progressive developing technological enhancements to the scopes and the instruments it made it easier and safer to approach and remove third ventricular masses, this decreased the morbidity for the surgery and also the possibility of addressing the problem of associated hydrocephalus made it a better way to perform intraventricular surgeries. That is why recently endoscopic proce-

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dures gained more popularity for intraventricular lesions [7-9].

### Patients and Methods

Eleven consecutive patients with strictly third ventricular masses with or without hydrocephalus with any age and gender were included. All patients were operated at Cairo University Hospitals from January 2016 till November 2017. All patients were assessed pre-operatively by taking full history, neurological examination, pre-operative scanning with CT scan and MRI scans. All patients undergone endoscopic surgery for their lesions, patients were positioned supine, head extended, aright sided burr-hole situated a little bit anterior farther than the standard Kokher burr-hole (2-3 centimeters anterior) which helps us to navigate more posterior if needed and also inspection of posterior third ventricle, the head is fixed in 3 pin skull clamp and mayfield fixator, a u shaped skin flap is used with the possibility of further extension if a bone flap is needed to be done for the possibility of microscopic surgery to be done at any point, the burr hole is done, dura coagulated with the bipolar, dural incision with a scalpel, corticectomy is done, the ventricle is inspected with the 0 degree diagnostic scope first the choroid plexus is followed to the foramen of Monro, the foramen is inspected for the lesion, the lesion is then addressed according to its nature (e.g. in cases of colloid cysts the cyst wall is coagulated the contents are evacuated then the walls are dissected away from the ventricular wall and the choroid plexus, then an ETV is done or a shunt inserted). After removal of the lesion an attempt of ETV for hydrocephalus relief is

performed if the lesion is not removed completely a septostomy is done and a VP shunt is inserted. Hemo stasis is achieved inspection of the ventricle for any residual tumor or points of bleeding, ample lavage and then closure is done. A follow-up CT scan is done at the first 24 hours, ICU monitoring of the patient, and follow-up of the neurological status. A follow-up MRI with contrast is done after three months and then every six months for two years then yearly for 3 years.

### Results

Eleven patients were included in the study, five males and six females, age ranged from 18 to 48 years, the pathological lesions were seven cases of colloid cyst, two cases of astrocytoma, one case epidermoid cyst and 1 case of arachnoid cyst, radical removal was achieved in nine lesions (82%) while two cases of incomplete removal both were astrocytoma (18%). No complications were reported except in one patient who had short term memory loss due to fornicial injury (a case with colloid cyst) which was only temporary lasted for less than one month while another patient had persistent postoperative HCP despite that we performed an ETV intraoperatively. The most common presentation was headache and blurring of vision, pre-operative HCP was present in nine patients and three patients had VP shunt insertion two intraoperative (incompletely removed gliomas) and one post-operative (the epidermoid patient). The mean length of stay at the hospital was three and half days, no recurrence was reported in all patients with complete resection for a follow-up period of twelve months.

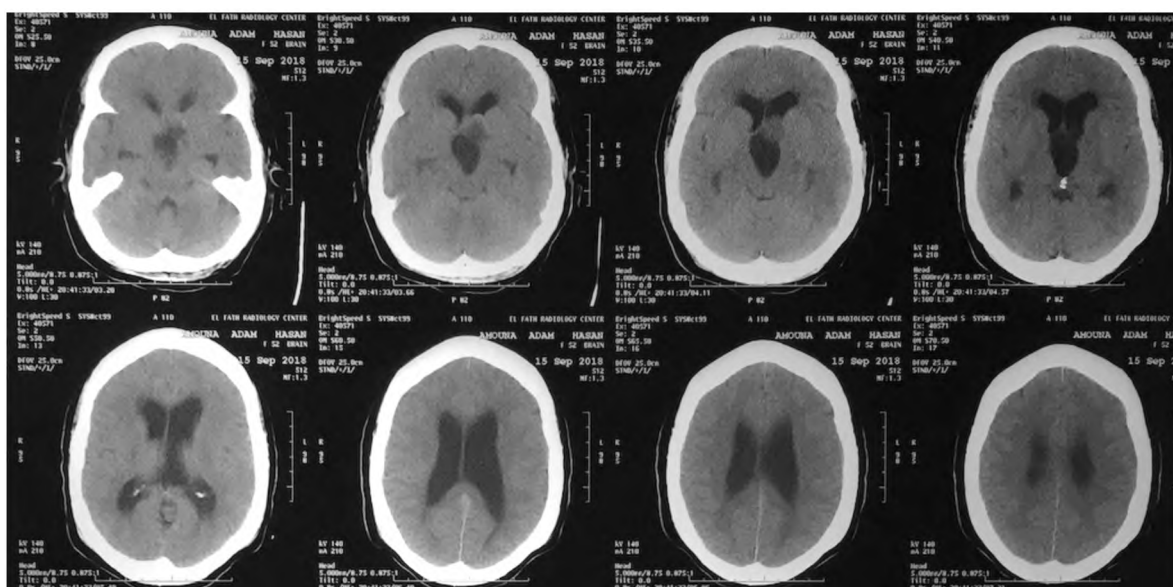


Fig. (1): Pre-operative CT of a 48 years old lady with increased tension manifestations scans showed 3rd ventricular mass with HCP, MRI showed different enhancement lesion, intraoperative it was an epidermoid with adherent choroid plexus (hence the enhancement), post-operative patient had HCP and a VP shunt was inserted.

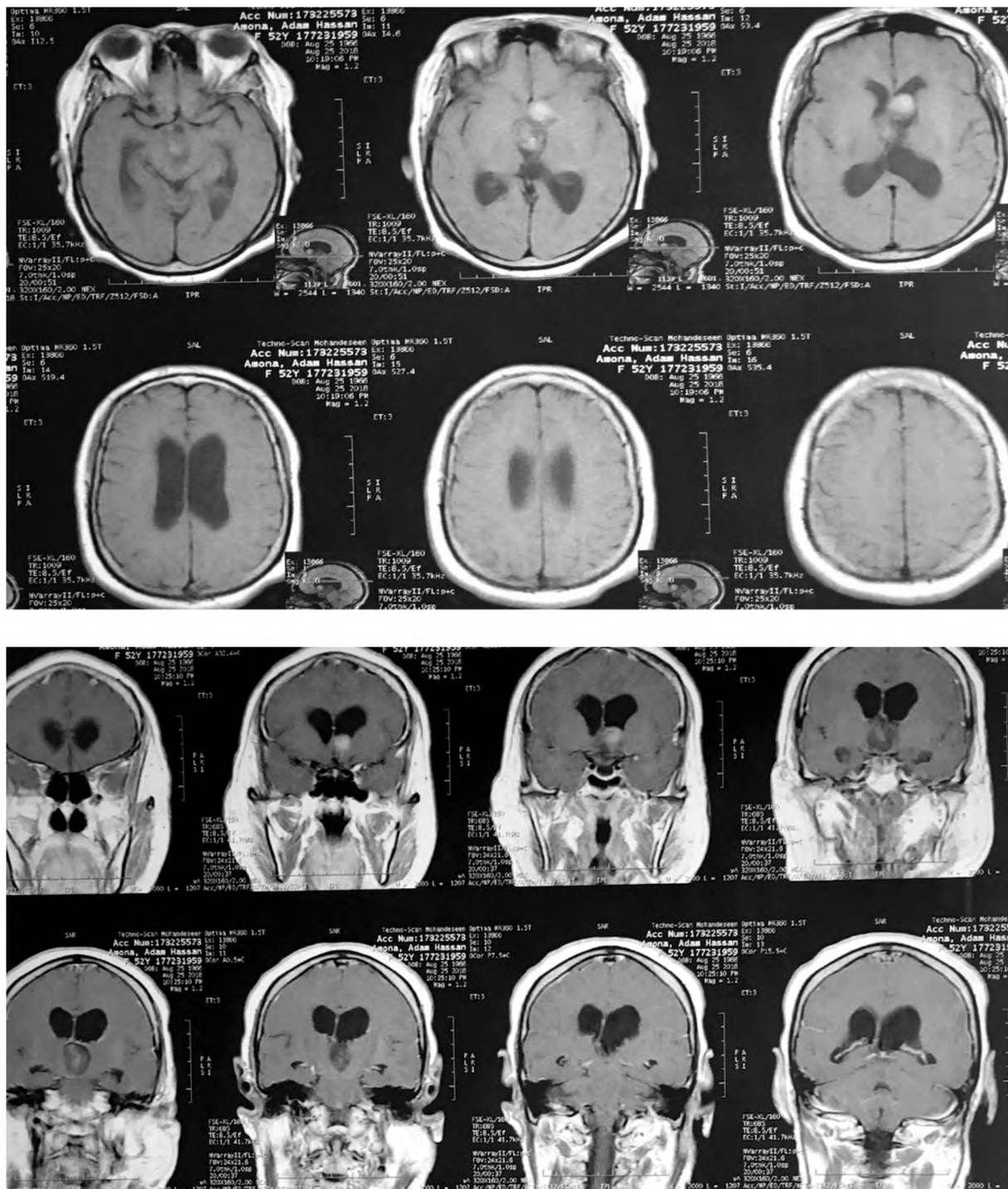


Fig. (2): Pre-operative MRI.

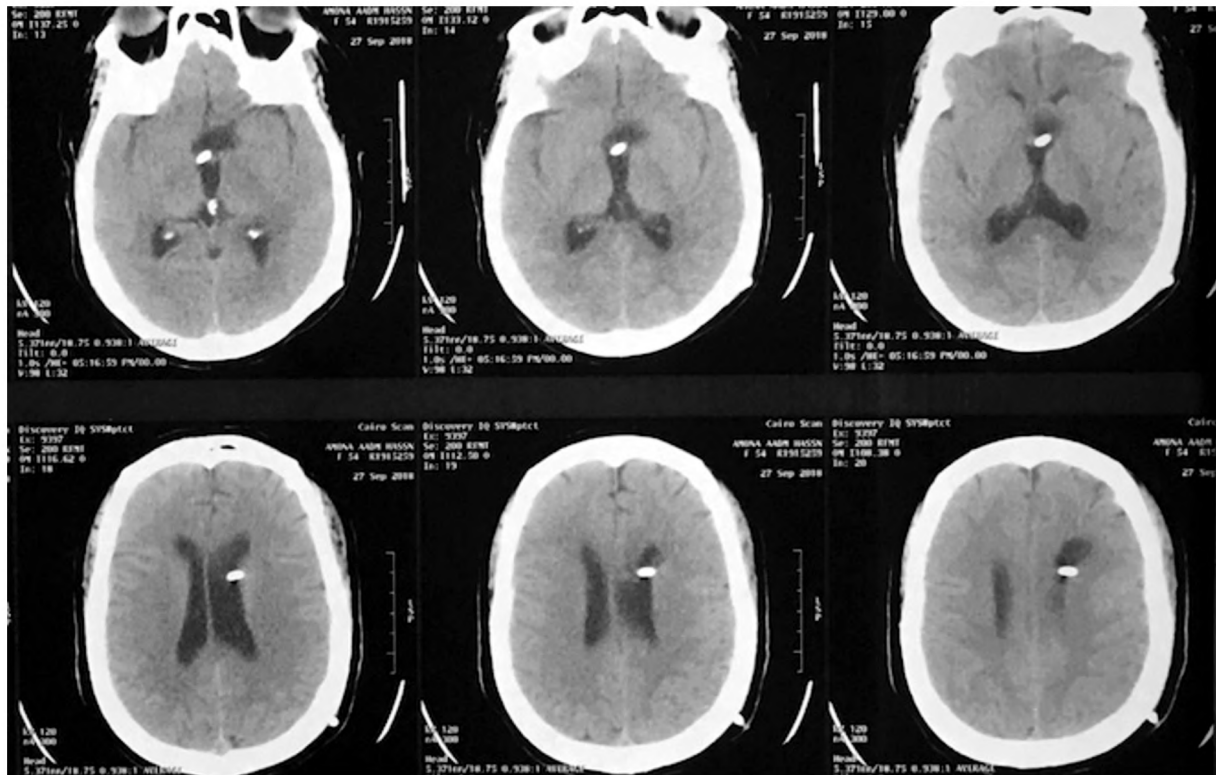


Fig. (3): Post-operative CT.

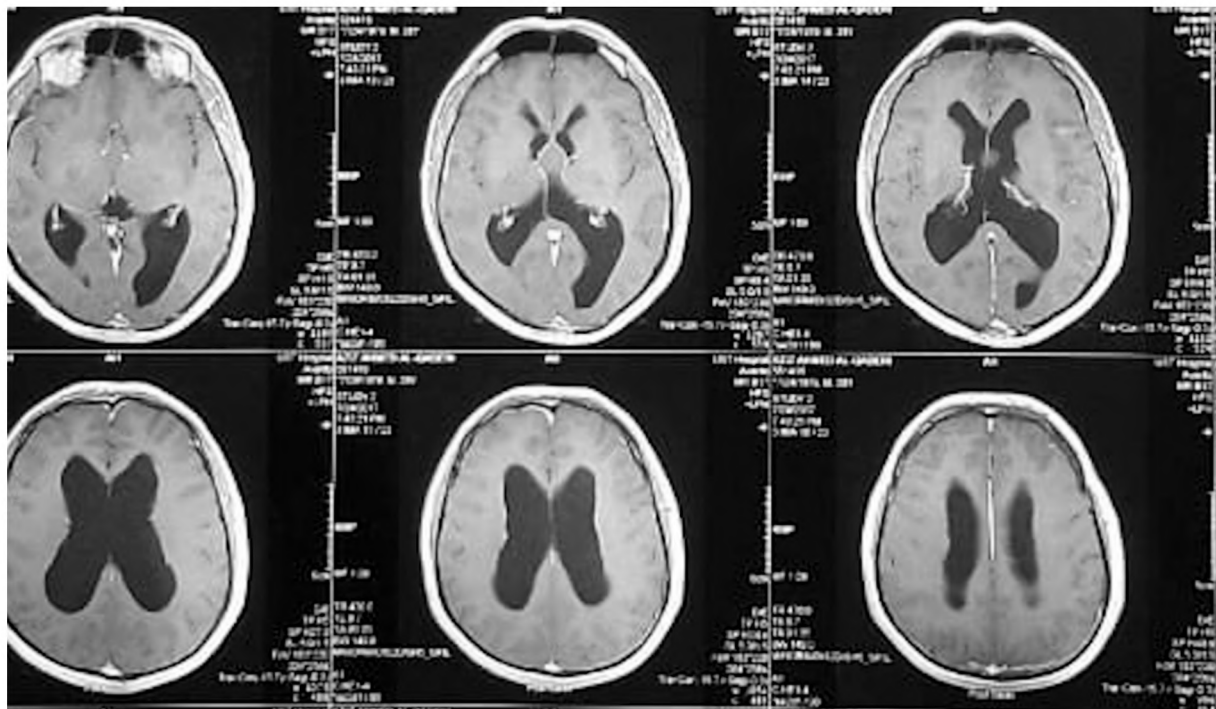


Fig. (4): Pre-operative MRI of a 28 years old male with colloid cyst with no HCP done endoscopically and didn't need any further intervention post-operative, patient had short term memory deficit resolved after one month.

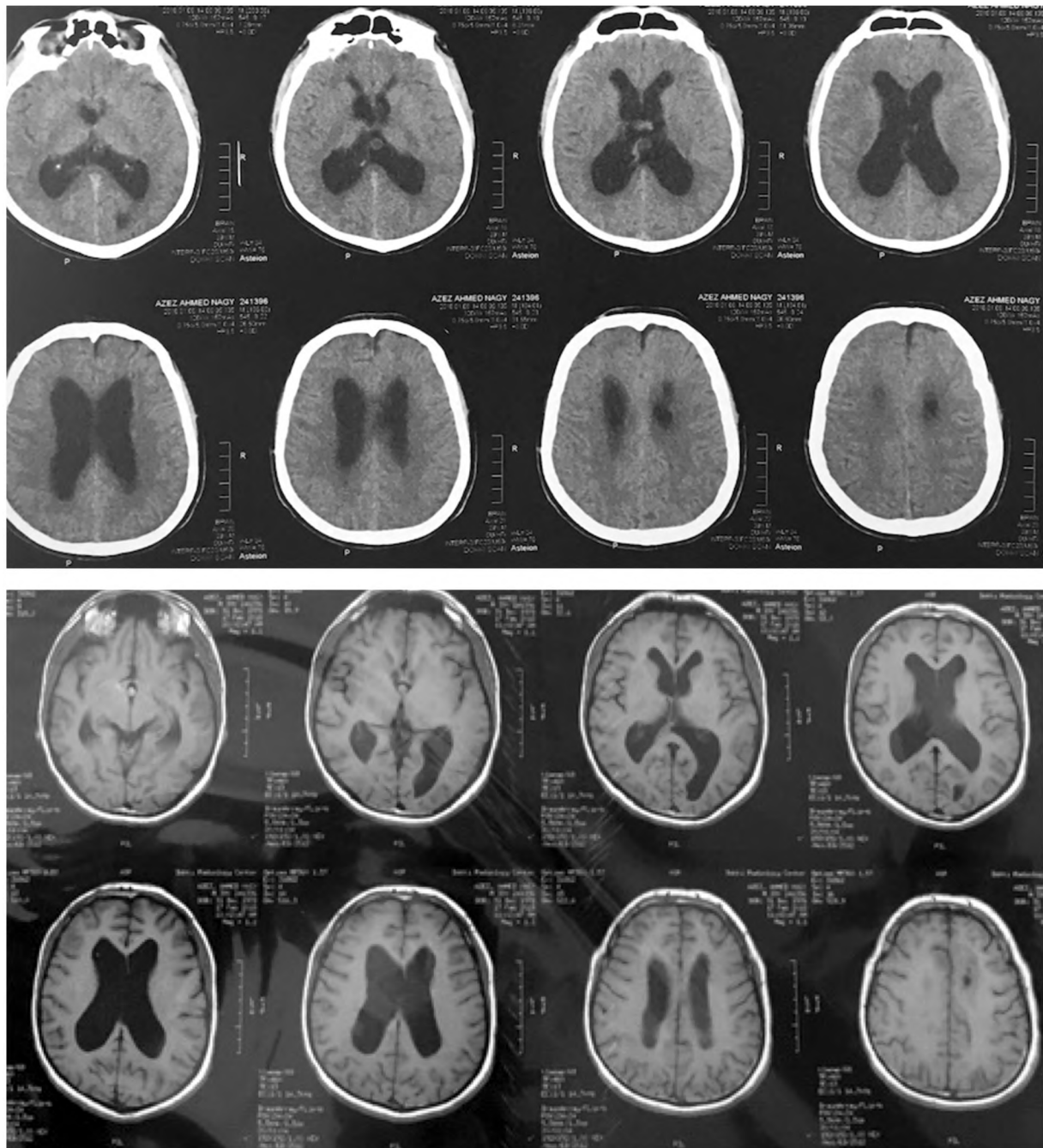


Fig. (5): Post-operative CT and MRI.

### Discussion

In our study, we had 11 cases 7 colloid cysts, 2 astrocytoma, one epidermoid and one case of arachnoid cyst with complication rate in 2 patients (18%), the mean hospital stay was 3.5 days. We also have done ETV in nine 8 cases and septostomy plus VP shunt in 2 cases while VP shunt in one patient, removal rate was total in 82% of cases with no recurrence in totally removed cases. Lewis et al., [10] operated 7 cases all were colloid cysts

with pre-operative HCP in five cases they didn't do any other adjunctive procedures with total removal rate of 100% with only one complicated patient and recurrence in one case. Abdou and Cohen [3] operated 13 cases all were colloid cysts all had HCP preoperative with no complications nor any adjunctive procedure and their radical removal rate was 76.9% with 0% recurrence. Gaab and Schroeder [11] operated 19 cases 7 colloid cysts, 3 subependymoma, 2 low grade gliomas, one germinoma, one pineal cyst, one epidermoid,

one hemangioma, one cavernoma, one choroid plexus papilloma and one ependymoma, the did ETV for two cases, septostomy for one case and aqueduct stent for 2 cases, they had rate of total removal of 68.4% with complications in only 3 cases and recurrence in one patient. King et al., [12] operated 13 cases of colloid cysts with pre-operative HCP in 12 patients, they performed septostomy in the whole series, the mean hospital stay was 2.3 days, rate of total removal was 83.3% with 2 complicated cases and no recurrence. Rodziewicz et al., [13] operated 12 cases of colloid cyst with HCP in 6 cases also doing septostomy for all patients and had total removal in 91% of cases with one complicated case and one case of recurrence. Decq et al., [14] also had a series of colloid cyst cases [22] with preoperative HCP in 21 cases, they didn't perform any adjuvant surgery and had no recurrence nor complications with rate of total removal of 63.6%. Kehler et al., [8] also had 10 cases of colloid cysts with total removal rate of 90%, one recurrence and complications in 3 cases. Hellwig et al., [15] operated 20 patients with colloid cysts with pre-operative HCP in 19 patients, the mean hospital stay was seven days, the radical resection was 81%, with one recurrence and 4 complicated cases. Husain et al., [16] operated 25 patients, 11 colloid cysts, 2 ependymomas, 2 choroid plexus tumors, 2 septum pellucidum cysts, 2 arachnoid cyst and others, radicality was 80%, with 3 complicated cases. Longatti et al., [17] had 61 patients with colloid cysts in their series with 53 patients with HCP pre-operatively, 7 patients had ETV done with radical rate of 57.7%, 32 complications and 24 recurrences. Souweidane and Luther [18] had 7 cases in their series 2 ependymomas, neurocytomas and gliomas plus one subependymoma, all had HCP with hospital stay of 2.6 days, 2 complicated cases, radicality of 71.4% and no recurrences. Lekovic et al., [19] operated 2 cases with hypothalamic hamartomas, with 50% radicality, no complications nor recurrence. Grondin et al., [2] operated 25 colloid cysts, 22 had HCP, with mean hospital stay of 3.8 days, 3 complicated cases, 96% radical removal and 1 recurrence. Horn et al., [20] operated 28 colloid cysts, 17 of them had HCP pre-operative, the mean hospital stay was 5.4 days, with radical resection rate of 52.6%, three complicated cases and no recurrence. Levine et al., [21] had 35 colloid cases in their series with 91.4% radicality, 7 complicated cases and 7 recurrences. Greenlee et al., [22] had 35 cases of colloid cysts with mean hospital stay of 3 days, three complicated cases, total removal rate was 82.8% and one recurrent case. El-Ghandour et al., [23] had 10 cases of colloid cysts with all patients had

HCP, did 2 ETV, total removal was 80% with one complicated case and no recurrence. Oertel et al., [24] had 11 cases in their series, did ETV for all cases had radical removal rate of 36.3% and 7 complicated cases. Mishra et al., [25] operated 59 colloid cysts, all had HCP, with 19 complicated cases and radical removal of 89.8%. Najjar et al., [26] operated 7 cases 3 were colloid cysts, 6 had HCP, ETV done in one case and septostomy in 2 others, with removal rate of 57.1%. Boogaarts et al., [27] had 90 colloid cysts in their series, did ETV for 7, 32 complications and total removal rate of 57.5% with 24 recurrent cases. Naftel et al., [28] operated on 4 patients 2 colloid cysts and 2 hypothalamic hamartomas with one patient having HCP, no reported complications and radicality rate of 75%. Dlouhy et al., [29] had 4 patients in their series 3 colloid cysts and one pineoblastoma with total removal 100%. Delitala et al., [30] operated 7 cases of colloid cysts with 4 patients with HCP with radical rate of 85.7%. Wilson et al., [31] operated 22 cases of colloid cysts, 19 of them had HCP, and the rate of total removal was 95.4%. Margetis and Souweidane [32] operated 67 patients with colloid cysts, had 4 complicated cases, total removal of 98.5% and 3 recurrent cases.

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## الجراحات المنظارية للبطين الثالث المخي

خلفية: تستخدم الآن الجراحة المنظارية للأورام البطينية الثالثة على نطاق واسع لأنها أقل توغلاً من العمليات الجراحية المجهرية التقليدية وتهدف هذه الدراسة لتقييم الجراحة التنظيرية للأورام البطينية الثالثة فيما يتعلق بالتحسن السريري ومعدل المضاعفات ومدى إستئصال الأورام.

النتائج: تم تحقيق الإستئصال التام في تسعة مرضى (٨٢٪)، في حين أن الإستئصال كان غير مكتمل في حالتين (١٨٪). كانت المضاعفات في حالة واحدة (٩٪) في شكل عاطفة قصيرة الذاكرة تحسنت بعد شهر واحد، وكان إستسقاء الرأس بعد العملية في مريض واحد (٩٪)، يعنى متوسط مدة الإقامة في المستشفى ثلاثة أيام ونصف، ولم يبلغ عن تكرار في جميع المرضى الذين يعانون من إستئصال كامل لمدة متابعة لمدة ١٢ شهراً.

الخلاصة: إن الإستئصال التنظيري للأورام البطينية الثالثة آمن، ومجهز بالحد الأدنى، ومجدي تقنياً وبنتيجه جيدة خاصة في الأورام التي تمت إزالتها تماماً، مما أدى إلى إنخفاض معدل الإصابة بالأمراض في الجراحة وكذلك إمكانية معالجة مشكلة إستسقاء الرأس المصاحب مما جعلها طريقة أفضل لإجراء العمليات الجراحية داخل البطين. هذا هو السبب في إكتساب الإجراءات بالمنظار في الآونة الأخيرة المزيد من الشعبية للجراحات داخل البطينات المخية.