

Hemostat Clamp Technique to Avoid occipital Sinus Bleeding Incidence in Posterior Fossa Surgeries

MOHAMED GABR, M.D.; HASHEM M. ABOUL-ELA, M.D. and AHMED ATALLAH, M.D.

The Department of Neurosurgery, Faculty of Medicine, Cairo University

Abstract

Background: Unpredictable critical bleeding may occur from routine method of division and coagulation of the occipital sinus in pediatric posterior fossa surgery when it represents the main venous drainage. We describe safe technique with curved hemostat clamps to minimize or even prevent bleeding from this site especially in pediatric patients.

Aim of Study: This study compared between two groups; a group where we open the dura with clamps and the other group where the dura is opened with routine division of the occipital sinus.

Patients and Methods: This study divided the patients into two groups:

Group A: 20 patients where the dura opened with hemostat clamps (Hemostat clamp technique) as described in detail below.

Results: The mean age in our study was 15.95 ± 13 months, the mean blood loss was greater in (B) group than it was in (A) group. In (A) group: Mean blood loss was 35.2 ± 16.4 in comparison to 159.25 ± 99.8 in (B) group.

Conclusion: This study applied this safe technique and compared it with the routine coagulation and division of the occipital sinus that carries a major risk of bleeding and swelling by comparison between two groups.

Key Words: Occipital sinus – Hemostat Clamps – Suboccipital – Durotomy.

Introduction

OCCIPITAL sinus extends from confluence of cerebral venous sinuses to the foramen magnum at the base of falx cerebelli. It drains into the marginal sinus [1]. Various size and location of the occipital sinus make surgical difficulties in posterior fossa surgeries. Its surgical significance in routine division of sinus [2]. Median suboccipital craniotomy is tailored for posterior fossa and foramen

magnum surgeries. Opening of a prominent occipital sinus may cause massive bleeding [3].

Patients and Methods

This study was conducted retrospectively on 40 patients, with posterior fossa lesions, admitted between July 2015 and June 2020 in Cairo University Hospitals.

Routine CT, MRI and MRV brain were done.

We excluded patients with cardiac anomalies, respiratory distress, major sinus venous anomaly.

Operative technique:

This study divided the patients into two groups:

- Group A: 20 patients where the dura opened with hemostat clamps (Hemostat clamp technique) as described in detail below.
- Group B: 20 patients where the dura opened with the classic technique by division and coagulation of the occipital sinus.

Median suboccipital craniotomy and Y-shaped dural incision were done. When we advance the Dural opening in the inferomedial direction cautiously we stop when the bleeding starts as we approach the occipital sinus. We applied two hemostat clamps on either edge of the dura at least 5mm from bony edges to be able to control any sudden bleeding from dural edges without retraction of dura under bone edges making it more difficult to control bleeding, and it may be fatal bleeding especially in young children. We proceed to cut the dura between the two hemostat clamps. We apply the hemostat clamps repeatedly and release, this method gives more crushing of the dural edges with more closure of sinus in the free dural edges, then we remove the clamp and suture the whole length of the crushed dural edge to avoid any further bleeding.

Correspondence to: Dr. Mohamed Gabr, The Department of Neurosurgery, Faculty of Medicine, Cairo University

Results

The mean age in our study was 15.95 ± 13 months.

The mean blood loss was greater in (B) group than it was in (A) group. In (A) group: Mean blood loss was 35.2 ± 16.4 in comparison to 159.25 ± 99.8 in (B) group.

One patient arrested and aborted surgery after massive bleeding and cerebellar swelling in group B. Two patients with massive bleeding in group B arrested and resuscitated with transfusion and craniotomy then resumed. So we have 3 patients had massive bleeding in group B (15%).

The pathologies of the posterior fossa lesions were 15 patients had medulloblastoma, 17 patients had ependymoma and 8 patients had astrocytoma.

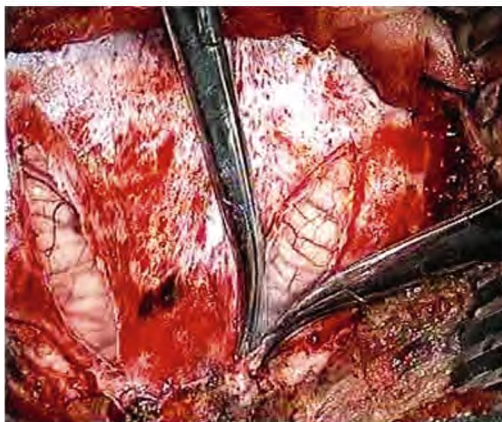


Fig. (1): Showing two mosquito clamps at one side making crushing of free dural flap.

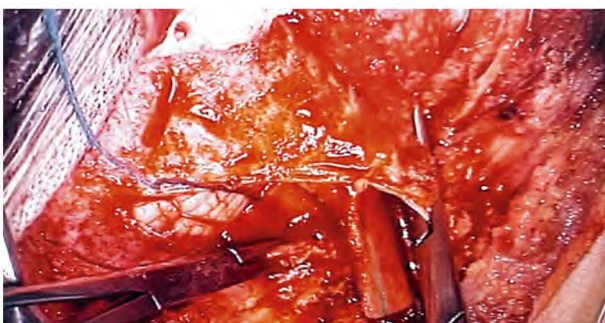


Fig. (2): Showing one limb of dural flap opened and proceeding with clamping and opening the other limb.



Fig. (3): Showing the two limbs of dural flap opened, sutured and dural flap reflected with no bleeding.

Discussion

It is crucial to consider the anatomical variants of intracranial venous anomaly in consideration to avoid injury of prominent occipital sinus [3]. Occipital sinus works as the main drainage of the intracranial veins in the case of hypoplastic unilateral or bilateral transverse sinus [3-5]. When doing a posterior fossa procedure, it is critical to avoid damaging the occipital sinus unduly to avoid further complication [6]. Temporary clamping of the sinus may be beneficial to examine the impact on venous drainage when the sinus is closed [7].

Previous method described to decrease or even prevent bleeding from occipital sinus with multiple stepwise hemostat clamps application and division of dura between the two hemostat clamps [8].

The technique described to apply proximal and distal to prominent occipital sinus before opening it, is used hemostat clamps to minimize bleeding [8]. In this technique also we can observe brain swelling before completion of cutting of the occipital sinus after its closure with hemostat clamps.

We compared in this study between 2 groups of patients:

In group (A) where 20 patients who had hemostat clamps application before opening the occipital sinus. Other 20 patients in group (B) where simple coagulation of sinus, opening and suture show more bleeding. The mean blood loss was greater in (B)

group than it was in (A) group. In (A) group: Mean blood loss was 35.2 ± 16.4 in comparison to 159.25 ± 99.8 in (B) group.

Conclusion:

The occipital sinus is important when it is the main drainage in order to avoid massive bleeding, cerebellar edema and swelling in pediatric posterior fossa surgeries. We applied this safe simple technique and compare it with the routine division and coagulation of the sinus that carries major risk of bleeding.

Conflict of interest: The authors declare that they have no conflict of interest.

References

- 1- TUBBS R.S., SALTER G. and OAKES W.J.: Superficial surgical landmarks for the transverse sinus and torcular heterophili. *Journal of Neurosurgery*, 93 (2): 279-81, 2000.
- 2- HAMNETT N.T.J., OGUNGBO B., NAHSER H. and JAVADPOUR M.: Anomalous cerebral venous sinus drainage. *British Journal of Neurosurgery*, 24 (4): 497-8, 2010.
- 3- KOBAYASHI K., SUZUKI M., UEDA F. and MATSUI O.: Anatomical study of the occipital sinus using contrast-enhanced magnetic resonance venography. *Neuroradiology*, 48 (6): 373-9, 2006.
- 4- WIDJAJA E. and GRIFFITHS P.D.: Intracranial MR venography in children: Normal anatomy and variations. *American Journal of Neuroradiology*, 25 (9): 1557-62, 2004.
- 5- PANIGRAHI M., KRISHNAN S.S. and VARMA D.R.: Crescent posterior fossa durotomy for occipito-marginal venous sinus preservation: A pilot study. *Acta Neurochirurgica*, 154 (11): 2115-21, 2012.
- 6- BALAK N., ERSOY G., USLU Ü., TANRIÖVER N., TAPUL L., ÇETIN G., et al.: Microsurgical and histomorphometric study of the occipital sinus: Quantitative measurements using a novel approach of stereology. *Clinical Anatomy*, 23 (4): 386-93, 2010.
- 7- FUKAI J., UEMATSU Y., SHINTANI A., NAKAI K. and ITAKURA T.: Intraoperative hemorrhage in medulloblastoma: A case report and review of the literature. *Child's Nervous System*, 18 (6-7): 356-60, 2002.
- 8- LEE H.C., LEE J.Y., RYU S.K., LIM J.M., CHONG S., PHI J.H., et al.: A method of posterior fossa dural incision to minimize hemorrhage from the occipital sinus: The "mosquito" method. *Child's Nervous System*, Dec. 1; 32 (12): 2429-31, 2016.

غلق الجيب الوريدي القذالي في جراحة القحف الخلفي باستخدام ملاقط مانعات النزيف

أجريت هذه الدراسة في القصر العيني في الفترة بين يوليو ٢٠١٥ إلى يونيو ٢٠٢٠.

تم إجراء جراحة فتح القحف الخلفي للمجموعة لأورام الغرفة الخلفية للمخ على أربعين طفلاً والذي تتراوح أعمارهم حول ١٥ شهر تقريباً.

تم عمل الفحوصات اللازمة من أشعة مقطعية ورنين مغناطيسي على المخ وكذلك الأوردة المخية لتوضيح التشوهات الوريدية في المخ.

تم إجراء الجراحة على أربعين مريض وتم تقسيمهم إلى مجموعتين: المجموعة الأولى شملت ٢٠ مريض حيث تم استخدام ملاقط منع النزيف لغلق الجيب القذالي قبل فتحه وشملت المجموعة الثانية ٢٠ مريض حيث تم فتح الجيب القذالي وغلقه بالطريقة التقليدية مع فتح الأم الجافية. وجد الأتي أن متوسط النزيف في المجموعة الأولى (٣٥ سم نزيف دموي) أقل من النزيف الدموي (١٥٩ سم نزيف دموي) في المجموعة الثانية. لذلك يعتبر فتح القحف القذالي في المجموعة الأولى أفضل جراحياً ويساعد أيضاً على تنبؤ التورم المخي أثناء فتح القحف في حالة أن الجيب القذالي أساسياً في تصريف الدم الوريدي للمخ.