Results of Surgical Management of Spontaneous Intracerebral Hemorrhage in Pediatrics, Local experience in Sohag University Hospital

Dr. Abdin K. Kasim[1], MD and Dr Ahmed Kamal Abdelhameid[2], MD.

1: Email: abdin_mail@yahoo.com ***Mobile***: *+201020196831*

2: Email: a.kamal_neuro@yahoo.com ***Mobile***: *+201006176567*

The Authors

1- ***Dr. Abdin Khair-Allah Kasim***

2- ***Dr Ahmed Kamal Abdelhameid***

The Short Title

Surgical Management of Spontaneous Intracerebral Hemorrhage in Pediatrics

The Full address:

Postal Address:

Neurosurgery Department, Sohag Faculty of Medicine, Sohag, Egypt.

Postal code:

82511

Phone: +201020196831 *(Dr Abdin K. Kasim)*

Fax: *+20934602963*

Emails: ***abdin_neurosurgery@hotmail.com , a.kamal_neuro@yahoo.com***

Keywords:

Spontaneous intracerebral hemorrhage, Intraventricular hemorrhage, Brain injury.

Abstract

Background: Spontaneous, non-traumatic intracerebral hemorrhage (ICH) remains a significant cause of morbidity and mortality throughout the world. Intracerebral hemorrhage (ICH) in children is relatively less common as compared to adults.

Early recognition and diagnosis of SICH are essential. The classic clinical symptoms include headache, vomiting, unconsciousness, fever, and neurological deficit; however, clinical symptoms alone are insufficient to reliably identify the exact positions of hematoma and differentiate SICH from other stroke subtypes.

Thus, cranial CT is necessary to confirm the diagnosis. The beneficial and inexpensive medical approaches for SICH include minimizing the damages from both increased ICP and secondary hypertension and avoiding the antiplatelet therapy.

Objective: Evaluation the role of surgical management of spontaneous intracerebral hemorrhage in 26 pediatric patients

Materials and Methods: We reviewed the medical records of 26 patients in the Department of Neurosurgery of Sohag university hospital diagnosed with spontaneous intracerebral hemorrhage from January 2012 to December 2016.Thes patients were evaluated as regard to: age, sex, Glasgow Coma Scale (GCS) on admission, neurological deficit, brain region affected, the surgicalmanagement and outcome.

RESULTS: 16 patients (61.5%) were female, and the mean patient age was 5.3 years. Parietal cortex was the most common site (18 patients 69.2%). The Glasgow Coma Scale (GCS) score at admission was below 7 in 2 patients below 12 in 8 patients (30.7%) fits was the only presenting symptoms in 6 patients (23%). In total, 2 patients (0.7%) died despite surgical management, with diffuse brain injury the cause of death.

CONCLUSION: Low GCS scores, associated intraventricular hemorrhage and posterior fossa hemorrhage are correlated with poor prognosis. Early and less invasive surgery in conjunction with short transportation time to the hospital could decrease mortality rates.

Full Text

Introduction

The pathological insult of the pediatrics intracerebral hemorrhage like in adults may be either post traumatic or spontaneous intracerebral hematomas. However the spontaneous intracerebral hematomas have the predominant incidence than stroke in the pediatric age groups but still not a common disease specially if compared with its incidence in adults.[(1)]

Regarding the most common cause of non-traumatic pediatric intraparenchymal hemorrhagearteriovenous malformations (AVMs) comes first and may account for 50% in most series.[(2,3,4,5)]

Authors defined the spontaneous intracerebral hematomas as intraparenchymal hemorrhage associated with or without intraventricular extension that not caused by trauma, hemorrhage within brain tumor, vascular malformation, hemorrhagic

transformation of arterial ischemic stroke, or cerebral sinus venous thrombosis. Isolated subarachnoid hemorrhages were excluded.[6]

Seizures are believed to the most common symptoms and may be the first and only presenting symptoms in pediatric spontaneous intracerebral hematomas. ICH may cause different neurological deficits depending on the site and the size of the hematoma. ICH neurological symptoms are developed within minutes to hours. Severe headaches and repeated vomiting in children followed an alteration in level of consciousness also could occur.[7,8]

Since computed imaging is more available and easier in use a non-enhanced CT-scan is the first choice for diagnostic examination. Further diagnostic imaging is required to roll out underlying pathology, using MR-angiography, CT-angiography, or conventional digital substraction angiography.[9]

The role of surgical management in cases of pediatric ICH still of controversy and most of the previous studies show no significant difference with intense medical therapy versus surgery. However, the International STICH (Surgical Trial in Intracerebral Hemorrhage) produced results that surgery within 96 hours of ictus may have a role to improve the prognosis.[10]

Treatment strategies could be a combination between the medical and the surgical interventions. Medical therapy aim to manage the intracranial pressure, antieliptic drugs, and neuro-protective agents. The surgical intervention aim to decrease the risk for the penumbra of progressive tissue damage immediately surrounding hematoma caused by the mechanical injury of the elevated intracranial pressure. Surgical intervention includes Craniotomy (where complete evacuation is done under vision) in case of lobar hematomas/ exploration of vascular lesions and Aspiration (using a burr hole, stereotactic or endoscopic measures) of smaller hematomas, producing desirable results.[11,12]

Patients and Methods

With the approval of the Ethics Committee, 26 pediatric patients had been introduced to Neurosurgery Department of Sohag University Hospital diagnosed with spontaneous intracerebral hemorrhage from January 2010 to December 2016.

Data were collected and recorded including the following information: age, gender, Glasgow Coma Scale (GCS) on admission, the site of the hematoma, and surgical outcome.

All patients presented for complete neurological examination will full radiological and imaging study and we exclude the patients that appeared to have underlying imminent pathology. Figure 1 shows preoperative CT scans of 2 cases.

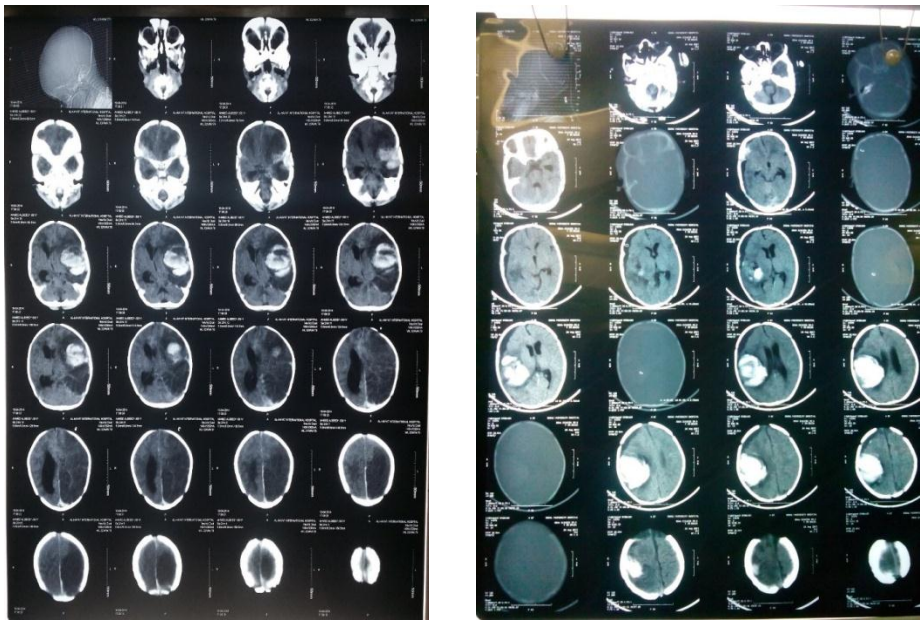

Fig 1: Pre Op CT of 2 cases

Surgical procedure:

Under general anesthesia with invasive blood pressure monitoring and CVP patient positioned as regard to the site of the intracerebral hematoma using May-field with head pins or using head rest. Skin incision should be guided by the site of the hematoma, most cases required question mark skin incision for the tempro-parietal hematomas (Figure 2 a).

Bone flap craniotomy had been done by four burr hole or by using the electric craniotome, after exposure of the dura we noted that never open the dura in a tense brain and a dehydrating measure by anesthesia should be taken first till the brain appears to be quite lax (Figure 2 b).

Cruciate incision of the dura or C shape incision, choosing the most nearest point in the cortical surface to the hematoma to avoid further injury to eloquent brain areas, in the dominant hemisphere we prefer to enter through the inferior temporal lobe, then transcortical incision and slight cortical retraction by brainself retaining spatula the hematoma will be delivered by itself.Parts of the hematomas are removed with forceps, while paying attention to avoiding new bleeding in margin zones of the hematoma. The use of an operating microscope is advantageous (Figure 3 a).

Fig 2 a and b : Skin Incision and bone flap

Using the microscope and bipolar coagulation diathermy with complete hemostasis should be done and cover the bed by surgcel for adequate hemostasis and satisfactory hematoma removal. We do simple dural repair with putting the bone flap and suction drain upon it for 48 hours (Figure 3 b).

Fig 3 a and b : Post Op CT of 2 cases

Patients suffering neurological impairment following surgery underwent rehabilitation.

All patients have to be followed up by periodic neurological examination and CT brain if needed every 3 month after discharge (Figure 4).

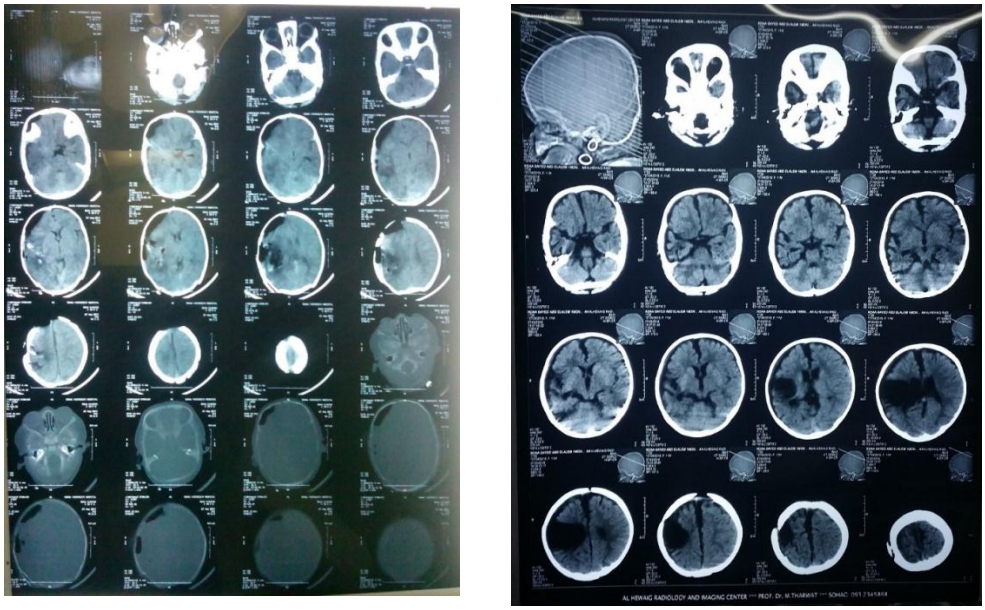

Fig 4: Post Op CT of 2 cases

Results

In our series there is a female predominance in the incidence of pediatric spontaneous intracerebral hematomas 61.5%, the mean patient age was 5.3 years.

Table (1) Incidence of pediatric intracerebral hematomas according to sex

Gender	No of cases
Male**s**	10
Female**s**	16

The temporal lobe was the most common site of incidence of the pediatric spontaneous intracerebral hematoma and was account for 69.2% in this series followed by parietal region. Frontal and posterior fossa were the least common sites of incidence.

Table (2) site of pediatric intracerebral hematomas

Site	Temporal	Parietal	Frontal	occipital
No of patients	18	6	1	1

The Glasgow Coma Scale (GCS) score at admission was below 7 in 2 patients (7.5%) and below 12 in 8 patients (30.7%).

Table (3) relation between GCS on admission and mortality

Patients	16	8	1	1
GCS on admission	12-15	9-11	6-8	3-5
Mortality	0	0	1	1

Fits was the only presenting symptoms in 6 (23%) patients before conscious level deterioration.

In total, 2 patients (7.5%) died within 2 weeks of surgical management.

In our 26 cases dura was repaired simply without need for graft.

The most common complication was infection, which was observed in 5 patients. The infection was either systemic or local wound infection with requirement of long-term and broad-spectrum antibiotic regimen.

Table (4) post-operative complications of pediatric intracerebral hematomas

complications	**infection**	**seizures**	**hydrocephalus**	**Delayed wound healing**	**CSF fistula**
Patients	5	4	1	1	1

In this study the mortality rate among the patients was 7.69% (n=2), diffuse brain injury with primary brain damage in one patient (3.8%; n=1), and brainstem affection in posterior fossa hemorrhage in other patient (3.8% n=1)

The mean follow-up period for all patients was 2years (range: 3 months-3 years). All patients required extended hospital stays, mainly due to the length ofpost-operative rehabilitation.

Of the 26 patients in this study, 24 (92.3 %) gained the ability for self-care and were discharged.

Discussion:

Our study demonstrates the results of surgical outcome among pediatric patients with spontaneous ICH. It was found that early surgery within 24-48 hours has best results among pediatric patients with lesional or lobar hemorrhage. Combination of

adequate surgical decompression with intensive medical therapy is necessary for favorable outcomes.

The previous pediatric intracerebral hematomas studies found that seizures are the most common presenting symptoms and it may be the first and the only symptoms in pediatric ICH especially in younger children. One of the largest prospective study found that sixty percent of children with ICH experienced acute symptomatic seizures the perinatal period and in about one-third with ICH during childhood. This indicates that children with ICH present with seizures more commonly than children with arterial ischemic stroke, in whom seizures are reported as a presenting symptom in 22%.Therefore antiepileptic drugs play in important role in management the pediatric spontaneous ICH and patients should continue in the antiepileptic measure for 6 months to one year post-operative.[13,14,15,16]

After all the STICH-trial showed that patients with superficial hemorrhages (distance to cortex surface less than 1cm) seem to benefit from surgery. Otherwise in small hemorrhages especially of the basal ganglia with small or absent neurological deficits conservative management is the role. Large lobar hematomas damaging a whole hemisphere, surgery is not advisable, especially patients with poor neurological state. Patients starting with initial small lobar hematoma with increasing in the size and detoriating clinical squeal, should also be treated surgically.[7]

We have to predict a bad prognostic outcome in those patient having low GCS below 8, surgical section of patient with higher GCS score improve the prognosis and outcome. This was coherent with the findings from the STICH Trial.[10]

In general pediatric spontaneous intracerebral hematomas had better results of survival than the older clients. Also patient with deep lobar hematoma associated with intra-ventricular extension was found to have poor prognosis.[17,18]

Depending on the fact that the mass effect caused by the intracerebral hematoma and the subsequent elevation in the intracranial pressure will increase the pathological cascades resulting in a great neuro-inflamatory and biochemical response so early and complete evacuation of the intracerebral hematoma could improve the neurological outcome and decrease the mortality rates.[19,20,21,22]

All the guidelines for the management of spontaneous intracerebral hematoma in the AHA/ASA don’t state that ultra-early removal of the hematoma improves functional outcomes or mortality rates and it shows that very early craniotomy would increase the risk of recurrent bleeding. Previous studies showed 40% of total 11 patients with ICH treated within 4 hours of hemorrhage onset rebleeding occur whereas the percent decreased to 12% in those patients treated within 12 hours of the hemorrhage onset.[23,24,25]

Avoiding the ultra-early intervention with its subsequent rebleeding studies suggested to perform surgery with 24 hours to decompress the brain before starts to be harden by the hematoma.[26,27]

Choosing the entry point with the better approach is an important issue to avoid the involving of the eloquent brain regions and providing better visualization to the hematoma and the surrounding brain this help in complete evacuation wit safe surgery.[23,28,29]

The frontal approach has been used for long time for many lesion as one of the safest pass to the brain bur recent studies showed that the lenticulostriate arteries have a high incidence to be injured in this approach causing intraoperative bleeding and worse outcomes.[30]

Especially in the dominant hemisphere using temporal approach as a choice in several studies evacuation could be accomplished in approximately70% of the cases without obvious intraoperative bleeding.[31]

Intraoperative bleeding was controlled using the bipolar coagulator and surgcel in the bed of the hematoma and we did not place a drainage tube within the hematoma cavity after securing hemostasis.

Conclusion

Adequate surgical decompression in the early stages and intensive multi-modal medical therapy has definite positive role in the treatment of pediatric patients with spontaneous intracerebral hemorrhage. Surficial lobar and lesional hematomas with no intraventricular extension and good G.C.S. score have good outcome.

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ملخص البحث

عنوان البحث:

نتائج التدخل الجراحي لنزيف المخ الذاتي في الأطفال، خبرة محلية بمستشفى سوهاج الجامعي.

الباحث:

١- دكتور / عابدين خيرالله قاسم – مدرس جراحة المخ والأعصاب بكلية الطب – جامعة سوهاج

٢- دكتور / أحمد كمال عبدالحميد – مدرس جراحة المخ والأعصاب بكلية الطب – جامعة سوهاج

مقدمة:

إن النزيف الذاتي داخل المخ لا يزال سببا هاما للمرض والوفاة في جميع أنحاء العالم. والنزيف الذاتي داخل المخ في الأطفال هو أقل شيوعا نسبيا مقارنة بالبالغين. وتشمل الأعراض السريرية المعتادة الصداع والقيء وفقدان الوعي والحمى والعجز العصبي. ومع ذلك فالأعراض السريرية وحدها غير كافية لتأكيد تجمع دموي وتمييزه من أنواع أخرى للسكتة الدماغية. وبالتالي فإن الأشعة المقطعية للمخ هي ضرورية لتأكيد التشخيص. وتشمل النهج الطبية المفيدة وغير المكلفة لنزيف المخ الذاتي التقليل من الأضرار الناجمة عن ارتفاع ضغط المخ والدم الثانوي وتجنب الأدوية المسيلة للدم.

الهدف:

تقييم دور الإدارة الجراحية للنزف داخل المخ العفوي في ٢٦ مريضا للأطفال

المرضى والطرق:

استعرضنا السجلات الطبية لعدد ٢٦ مريضا في قسم جراحة المخ والأعصاب في مستشفى سوهاج الجامعي يعانون من نزف ذاتي داخل المخ. وقد تم تقييم المرضى فيما يتعلق بالآتي: العمر والجنس ومقياس غلاسكو للغيبوبة عند الدخول للقسم والعجز العصبي ومنطقة الدماغ المتضررة والتدخل الجراحي والنتيجة وقمنا بتحليل النتائج.

النتائج:

كان أكثر المرضى (٦١.٥٪) من الإناث، وكان متوسط عمر المرضى ٥.٣ سنوات. وكانت منطقة القشرة الجدارية هي الموقع الأكثر شيوعا (١٨ مريضا ٦٩.٢٪). كان مقياس غلاسكو للغيبوبة عند الدخول أقل من ٧ في مريضين وأقل من ١٢ في ٨ مرضى (٣٠.٧٪) بينما كان الصرع هو العرض الوحيد في ٦ مرضى (٢٣٪). وفي المجموع، توفي ٢ مريض (٧٪) على الرغم من التدخل الجراحي، وسبب الوفاة كان تدمير شامل للمخ بسبب بالنزيف.

الاستنتاج:

انخفاض درجات غس، يرتبط نزيف داخل البطيني والنزف الحفرة الخلفي مع سوء التشخيص. الجراحة المبكرة وأقل الجراحة بالتزامن مع وقت النقل القصير إلى المستشفى يمكن أن تقلل من معدلات الوفيات.

الكلمات الإفتتاحية:

نزف ذاتي داخل المخ ، نزيف داخل البطيني، إصابات الدماغ .