Clinical characteristics of 24 patients of spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Abstract

Introduction

Intracerebral Hemorrhage (ICH) is defined as acute spontaneous bleeding into the brain parenchyma. Identifying the most probably cause of the bleeding and correction of the associated co-morbidities are the corner stone of the management. The main goal in the management is trying to stop the on-going neuronal damage by limiting the expansion of the hematoma and dealing with the presenting neurologic complications by the medical conservative or the surgical intervention.

Aim of the work

The study aims to improve the quality of life for patients with intracerebral hemorrhage.

Patients and methods

This is a prospective study that included all patients with spontaneous ICH that diagnosed and underwent surgical intervention for evacuation. Study ranged between January 2017 and December 2017, within two centres in Egypt. Clinical and radiological data were collected and analyzed.

Results

75% of the patients were males and the mean age of the all patients was 56years. 91% of the patients had hypertension. 41% of the patients had presented with coma. Supratentorial hemorrhage was diagnosed in 79% of the patients and about 83% had large sized hematoma. 58% of the patients had parietal ICH while 20% had posterior fossa hemorrhage.

Conclusion

A lot of studies and scientific papers were published about the pathophysiology and management of ICH. Most of the authors recommended that the both ways of management had nearly equal functional outcome and prognosis. Our study showed the main factors that most of the neurosurgeons think about while managing the patients of ICH. We found that posterior fossa hemorrhage and cortical hemorrhage had the best prognosis.

Keywords: intracerebral hemorrhage, ICH, spontaneous ICH, Egypt

Introduction

A lot of patients are presenting with symptoms and signs of increased intracerebral pressure. Many risk factors are well known for occurrence of the ICH but morbid diseases like hypertension and diabetes mellitus are the important ones. Most of the patients are within the middle and old age groups. Smoking and alcohol were found to be enhancing factors for ICH incidence. Emergency physicians and neurologists mostly refer those patients for the neurosurgical consultation for determining the way of management. The main goal in the management is trying to stop the on-going neuronal damage by limiting the expansion of the hematoma and dealing with the presenting neurologic complications by the medical conservative or the surgical intervention.

Clothing and tampon effect of the surrounding tissues were able to self-limit the extent of injury. The neurological deterioration is related to the process of the peri-hematoma edema.

The increase of the hematoma volume occurs within three hours from ICH onset even in the absence of coagulation defects, that known as the process of early hematoma growth. The peri-hematoma edema was progressively increased till the first 72hours. People who are on oral anti-coagulants are at high risk for incidence of the ICH, compared with patients who are not.

Although the INR values that exceed 4 are associated with high risk of ICH, the majority of oral anti-coagulant related ICH occurs while INR is within the therapeutic range. Generally, high INR increases the risk of occurrence of ICH, worse the prognosis and increases mortality. Immediate correction of the coagulation profile once ICH is diagnosed, limit the hematoma expansion.
Methods
This study included the patients with ICH that managed surgically by the team of neurosurgery in Suez Canal University Hospital, Ismailia city, Egypt and the team of neurosurgery in Damanhour Medical National Institute, Damanhour city, Egypt, between January 2017 to December 2017. The team unified the protocol of management, medical and surgical ones. The two centres within this period of time, received more than 100 patients of ICH but surgical intervention was done for 24 patients.

Type of study
This study was a prospective clinical study for evaluating the clinical and functional outcomes of patients who were operated for management of the intracerebral hemorrhage with applying the ICH grading scale.

Place of the study
The Neurosurgery Department, Suez Canal University Hospitals, Ismailia, and Neurosurgery Department, Damanhour Medical National Institute, Damanhour, Arab Republic of Egypt.

Time of the study
From January 2017 to December 2017

Study population
The patients presented with ICH who matched with the following criteria:

Inclusion criteria
a. Patients were elder than 18 years old.
b. Both sexes were included.
c. Treated within 14 days of onset.

d. Patients with recent trauma.
e. Patients associated with brain tumors.
f. Patients who had conversion of an ischemic infarction.
g. Patients had vascular arteriovenous malformations (AVM) or aneurysms.
h. Recent intracranial surgical intervention.

Exclusion criteria
1. Patients were elder than 18 years old.
2. Both sexes were included.
3. Treated within 14 days of onset.
4. Patients with recent trauma.
5. Patients associated with brain tumors.
6. Patients who had conversion of an ischemic infarction.
7. Patients had vascular arteriovenous malformations (AVM) or aneurysms.
8. Recent intracranial surgical intervention.

Results
Our team operated 24 patients with ICH. Here we mentioned the clinical characteristics of those patients that most of the neurosurgeons considered while determining the possibility of surgical intervention.

Gender
18 patients were males, while 6 patients were females.

Age
The patients were be classified according to age group as following,

a. Less than 40 years: 1 patient.
b. 40 to 50 years: 3 patients.
c. 51 to 60 years: 11 patients.
d. 61 to 70 years: 7 patients.
e. 71 to 80 years: 2 patients.

Co-morbidity
91% of the patients had history of hypertension. 54% of those patients of hypertension had other comorbid diseases like Diabetes mellitus, end stage renal disease and cardiac disease.

Glasgow coma scale
b. Score (11-12): no patients.
c. Score (9-10): 8 patients.
d. Score (8): 3 patients.
e. Score (5-6-7): 12 patients.
f. Score (1 to 4): no patients.

Motor scale of GCS
83% of the patients (20 patients) had score 4 to 6 among the motor scale alone while, 17% (4 patients) had score of 1 to 3.

Presentation
10 patients (41.7%) were presented by coma and while 12 patients (50%) were presented by disorientation while, 2 patients (8.3%) were presented by aphasia and hemiplegia.

Hemorrhage location
a. Supratentorial: 19 patients (79%).
b. Infratentorial: 5 patients (21%).

Hemorrhage volume using the (ABC/2) formula
a. More than 30 ml were 20 patients (83%).
b. About 30 ml were 2 patients.
c. Less than 30 ml were 2 patients.

Cortical or subcortical hemorrhage
a. Cortical hemorrhage was in 15 patients (62.5%).
b. Subcortical hemorrhage was in 9 patients (37.5%).

Anatomical location according to lobes
a. Frontal lobe alone: 1 patient.
b. Parietal lobe alone: 14 patients (58%).
c. Temporal lobe alone: 1 patient.
d. Occipital lobe alone: no patients.
e. Temporo-parietal lobes: 1 patient.
f. Parieto-occipital lobes: 2 patients (8%).
g. Posterior fossa: 5 patients (20%) (Figure 1).
Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Association with IVH

33% of the patients (8 patients) had IVH and 3 of those 8 patients had insertion of EVD device.

Glasgow outcome scale
- Score 5: eight patients (33%).
- Score 4: 6 patients (25%).
- Score 3: one patient.
- Score 2: three patients.
- Score 1: six patients (25%).

Mortality

Among the 24 operated patients, six patients (25%) were died. In the following sentences we will mention the clinical characteristics of those died patients. Males constituted 83% of them. All of them were younger than 70 years and had history of hypertension. 83.3% of them had supratentorial hemorrhage while 16.7% had infratentorial hemorrhage. All had hemorrhage more than 30 ml in volume. 83.3% had subcortical hemorrhage while 16.7% had cortical hemorrhage. 50% of them had ICH in the parietal lobe. 66.6% of them had IVH and all the patients who had undergone EVD device insertion were died. 66.6% of them had Glasgow Coma Scale 4 or more while 33.3% had GCS less than 4.

Discussion

A lot of scientific studies showed that surgical intervention was nearly equal to the conservative management in the prognosis of the ICH. Juvela et al. in 1989 found that most of the ICH patients should be managed conservatively. So the necessity of developing a certain protocol or scale for helping in taking the decision got many studies began in this point. In 2001, Hemphill et al. published a grading scale that used for the expecting the prognosis of the patients whose intracerebral hemorrhage and named later on as ICH score. The scale contains 5 items: GCS score, Age, Location, ICH volume and Intraventricular hemorrhage. The highest score is 6 points, and the more points the more susceptibility of mortality. This score is widely accepted and a lot of neurosurgeons take their decisions based on it, but many patients are presenting with criteria that pushing the decision for surgical intervention while having very bad prognosis and high mortality when scored by the ICH scale.

The main concepts of the team are the following:

a. The better the GCS, the better the prognosis.
b. The better motor scales of the GCS, the better the prognosis.
c. The earlier surgical intervention, the better the prognosis.
d. Earlier surgical intervention within the infra-tentorial hemorrhage gives better prognosis.
e. Avoidance of the basal ganglia gives better prognosis.
f. The better control of the co-morbidities, the better the prognosis.
g. Age, is not factor that determine the way of management rather determining the expectancy of the primary cause of the hemorrhage.
h. Midline shift and peri-tumoural edema are the main factors that determine the extent of the bone flap and reinsertion of the bone flap at the end of the surgery or not.
i. Wide reasonable bone flap is much preferable than the small one (Figure 2).

Surgical intervention has not been proven beneficial in randomized controlled trials with exception of the cerebellar hemorrhage. This is very close to our net conclusion in dealing with the posterior fossa hemorrhage. Some systemic review studies suggested the potential positive effects of surgical intervention of the ICH. STICH II, showed that early surgical intervention for lobar ICH within 1 cm of the cortex and without IVH may be beneficial.

Minimal invasive surgical techniques may also provide promising evidence for the future surgical treatment for acute ICH but the issue of decompression and avoidance of re-collection is still detectable item. Removal of the clot decreases mass effect and decrease neurotoxicity related to hemoglobin, thrombin and iron accumulation.

Akpinar et al. in 2019 published that very early surgical intervention did not create a difference in treatment between mortality rates and observed that GCS of the patients while arrival and the suspected nature of the hematoma were the most important factors for the prognosis of ICH patients. Hegde et al. in 2019 found...
that surgical evacuation of spontaneous moderate sized ICH did not
demonstrate any quantifiable improvement in functional outcome
but it reduced mortality caused by delayed peri-hematomal oedema
(Figure 3).\textsuperscript{19} Different modalities of the surgical intervention among
the ICH patients are mentioned as the following:\textsuperscript{20,21}
a. Craniotomy through bone flap.
b. Craniotomy through small bone flap.
c. Sterotactic drainage.
d. Neuro-endoscopic drainage.\textsuperscript{21}
e. EVD.

The conclusion was that craniotomy through bone flap was suitable
for patients with large hematoma and brain herniation. While in 2019,
Sabino et al, found that neuro-endoscopy was preferable for patients
with a supratentorial hematoma more than 60mL and with a poor GCS
score (4–8).\textsuperscript{22} Most of the authors recommend doing follow up CT
brain after 3 hours from the initial one to evaluate the expansion of the
hematoma (Figures 4–13).\textsuperscript{23}

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{figure2a.png}
\includegraphics[width=0.4\textwidth]{figure2b.png}
\caption{(A) CT brain showing left parietal ICH extending from the cerebral cortex to the ventricular system. (B) Post-Operative CT brain showing the evacuation of the hematoma with reinsertion of the bone flap. No increase of the volume of the Intraventricular hemorrhage, preserved opened sylvian fissures and cerebral sulcus and gyrus architecture.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{figure3a.png}
\includegraphics[width=0.4\textwidth]{figure3b.png}
\caption{(A) CT brain showing right frontal lobe ICH with peri-hematomal edema. (B) Post-Operative CT brain showing evacuation of the hematoma through open craniectomy with reinsertion of the bone flap.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{figure4a.png}
\includegraphics[width=0.4\textwidth]{figure4b.png}
\caption{(A) CT brain showing left parietal massive ICH. (B) Post-Operative CT brain showing total evacuation of the hematoma through open craniectomy and no radiological signs of brain edema were observed.}
\end{figure}

Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Figure 5 (A) CT brain showing right temporo-parietal ICH extending from the cerebral cortex to the posterior horn of the right lateral ventricular horn. (B) Post-Operative CT brain showing total evacuation of the hematoma through open craniectomy. Notice the right sylvian fissure, that was compromised in (A) and opened in (B).

Figure 6 (A) CT brain showing posterior fossa hemorrhage and 4th ventricle could not be seen. (B) Post-Operative CT brain showing the evacuation of the hematoma through small craniectomy with restoration of the patency of the 4th ventricle and basal cisterna.

Figure 7 (A) CT brain showing left fronto-parietal ICH extending to the lateral ventricle (B) Post-Operative CT brain showing total evacuation of the hematoma through open craniectomy.

Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Figure 8 (A) CT brain showing left fronto-parietal ICH extending to the lateral ventricle (B) Post-Operative CT brain showing evacuation of the hematoma through open craniectomy.

Figure 9 (A) CT brain showing right high cortical parietal ICH. (B) Post-Operative CT brain showing total evacuation of the hematoma through small open craniectomy. (C and D): Intraoperative figures showed marking of the skin after localizing if the hematoma.

Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Figure 10 (A) CT brain showing left lobar temporal ICH compressing on the brain stem associated with hydrocephalic changes. (B) Post-Operative CT brain showing the evacuation of the hematoma with craniectomy. (C) Three Dimension reconstructive CT showing the reasonable craniectomy.

Figure 11 (A) CT brain showing left deep parietal ICH extending to the ventricular system. (B) Post-Operative CT brain showing the evacuation of the hematoma with reinsertion of the bone flap. Note the right ventricular catheter of the EVD device.

Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Figure 12 (A) CT brain showing posterior fossa hemorrhage and 4th ventricle could not be seen. (B) Post-Operative CT brain showing the evacuation of the hematoma through wide craniectomy.

Figure 13 (A) CT brain showing left lobar parietal ICH extending from the cerebral cortex to the ventricular system. (B) Post-Operative CT brain showing the evacuation of the hematoma with reinsertion of the bone flap. Note the sylvian fissures and cerebral sulcus and gyrus architecture pre and post-operative. (C) Intra-operative figure showing the gross picture of the evacuated clotted hematoma.

Clinical characteristics of 24 patients with spontaneous intracerebral hemorrhage surgically evacuated within one year in two centers, Egypt, and neurosurgical view

Conclusion

All the members of the team are neurosurgeons and from those results we conclude the following items. Posterior fossa hemorrhage showed the best functional outcome when operated early. Wide craniotomy did not affect the outcome but can do help in dealing with malignant brain edema. Correction of the bleeding profile must be started while the patient presented but it should not delay the surgical intervention.

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Funding

None.

References