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Research Article

Acute Subdural Hematoma Evacuation among Patients in Saudi Arabia, Jeddah

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Abstract

Acute subdural hematoma (ASDH) is a standout amongst the most common neurosurgical circumstances. There is absence of consistency in the treatment of subdural hematoma among surgeons as far as different treatment systems. Clinical presentation might differ from no indications to unconsciousness. Subdural hematoma (SDH) is typically analysed by contrast-enhanced computed tomography scan (CT). Magnetic resonance imaging (MRI) scan is more sensitive in the identification of bilateral isodense subdural hematoma, various loculations, intrahematoma membranes, bleeding, hemolysis, and the size of capsule. Contrast-enhanced CT or MRI could distinguish related essential or metastatic dural infections. While certain history of injury could be gotten in a larger part of cases, a few cases might be auxiliary to coagulation defect, intracranial hypotension, use of anticoagulants and antiplatelet medications, and so forth., Recurrent bleeding, expanded exudates from external membrane, and cerebrospinal fluid entanglement have been ensnared in the broadening of subdural hematoma. Burr-hole evacuation is the treatment of select for SDH. The vast majority of the current trials support the utilization of drain to decrease reappearance rate. Craniotomy and twist drill craniotomy likewise assume a part in the management. Dural biopsy has to be taken, particularly in reappearance and thick outer membrane. Single management approach is not suitable for all the cases of SDH. Better comprehension of the idea of the pathology, balanced determination of a perfect treatment methodology for an individual patient, and recognizable proof of the benefits and confinements of various surgical systems could help in enhancing the visualization.

Keywords: *Acute Subdural Hematoma; Neurosurgical; Surgical Management; Subdural Hematoma*

Introduction

Acute subdural hematoma (ASDH) signifies a major clinical unit in traumatic brain injury (TBI), identified on computed tomography (CT) as extraaxial, hyperdense, crescent lesion between the dura, and brain parenchyma. Acute subdural hematoma is an acute space

occupying lesion to increase intracranial pressure (ICP), and is frequently difficult by co-existing intracranial lesions, containing a range of diffuse injuries, contusional hematomas, and edemas. Furthermore, it is similarly amended by consequent phenomenons such as both global and focal ischemia beneath hematoma, reactive hyperemia/hyperperfusion, coagulopathy, delayed hematomas, and more. As of its multifaceted pathophysiology, mortality of acute subdural hematoma has been remaining high, regardless of progresses in emergency medical systems, diagnostic modalities, and treatment procedures [1].

By way of the population ages, neurosurgeons challenge with a increasing number of elderly with TBI including acute subdural hematoma, frequently suffering from delayed intracranial hematoma in connotation with prehospital anticoagulant and antiplatelet. Such elderly-specific situation has been broadly known in recent years; nevertheless administrations have not been well recognized [2].

Subdural Hematoma

A subdural hematoma (SDH) is a typical neurosurgical issue that regularly requires surgical intercession. It is a kind of intracranial discharge that happens underneath the dura, basically, an accumulation of blood over the surface of the cerebrum and might be related with other brain injuries. Subdural hematomas can be related with high mortality and morbidity, notwithstanding when the best therapeutic and neurosurgical caution is given. They are generally caused by injury yet can be unconstrained or result from a methodology such as lumbar cut [3]. Anticoagulation as with heparin or warfarin might be a contributing component. The act of trephination of the head (chipping or penetrating an opening through the skull) has been followed back to antiquated circumstances.

In 1840, the French creator Balzac portrayed an instance of constant SDH, including its awful inception and surgical treatment [4]. In 1883, Hulke first depicted effective neurosurgical treatment of interminable SDH. Although cerebral angiography could be utilized to restrict SDHs in the ahead of schedule to-center twentieth century, the improvement of computed tomography in the late 1970s spoke to another jump in tolerant care [5].

Acute subdural hematoma

The mortality of acute subdural hematoma has been accounted for to be in the scope of 36 - 79%. Numerous survivors don't recover past levels of working, particularly after an acute subdural hematoma sufficiently serious to require surgical waste. Good result rates after intense acute subdural hematoma go from 14% to 40%. A few arrangements have demonstrated an expansion in positive result in more youthful patients [6]. Ages more youthful than 40 years were related with a mortality of 20%, though ages of 40 - 80 years were related with a mortality of 65%. Ages more seasoned than 80 years conveyed a mortality of 88%.

Discoveries exhibited by methods for computed tomography or magnetic resonance imaging may help demonstrate visualization. Such discoveries may incorporate the thickness or volume of the hematoma, the level of midline move, the nearness of related horrible intradural sores, and the pressure of the brainstem or basal cisterns. The primary computed tomography output may think little of the extent of parenchymal wounds [7]. Elevated intracranial pressure postoperatively demonstrates a poor forecast and may show the seriousness of the basic cerebrum damage (trauma, secondary infarction). Moreover, by and large, a poor preoperative neurologic status might be a harbinger of a poor result. Other poor prognostic indicators for ASDH have been described to incorporate the underlying and postresuscitation Glasgow coma scale (GCS), the GCS motor score on admission, pupillary abnormalities, alcohol use, injury by motorcycle, ischemic damage, hypoxia or hypotension, and overall ability to control ICP [7,8].

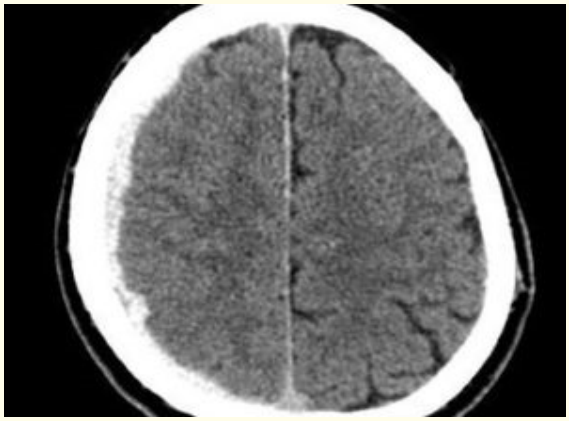

Figure 1: *Acute subdural hematoma (ASDH).*

Chronic subdural hematoma

Result after drainage of a chronic subdural hematoma CSDH has likewise been found to associate with preoperative neurologic status. Early analysis before a noteworthy neurologic disintegration may correspond with a better anticipation. No correlation has been found between preoperative CT findings and postoperative result. The mortality inside 30 days of surgery is 3.2-6.5%. Around 80% of patients continue their prehematoma level of capacity, and ideal results happen in 61% of patients matured 60 years or more youthful and in 76% of patients more established than 60 years.

In an arrangement by Mori and Maeda, 89.4% of patients with CSDH who were treated with a closed drainage system had a decent recuperation and 2.2% had exacerbated. Old age, prior cerebral localized necrosis, and subdural air after surgery connected with poor cerebrum extension [9]. Stanisic., *et al*. announced a 14.9% postoperative repeat rate; different elements were related with this [10].

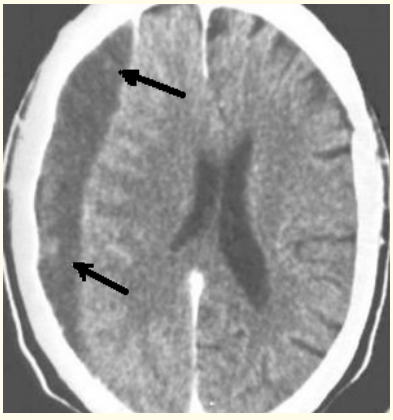

Figure 2: *CT scan of Chronic subdural haematoma (CSDH) of right brain hemisphere.*

Surgical Treatment Symptoms

Surgical evacuation through craniotomy is regularly reflected in patients with an Acute subdural hematoma thicker than 5 mm measured by axial computed tomography and who have any neurologic signs, such as lethargy or other variation in mental status, or a focal neurologic discrepancy. Bullock., *et al*. [11] reported that an acute SDH with a thickness larger than 10 mm, or a midline shift greater than 5 mm on computed tomography (CT) scan must be surgically evacuated, unrelatedly of the patient's Glasgow Coma Scale (GCS) score.

The nature and timing of neurosurgical mediation in a patient with a subdural hematoma (SDH) relies upon numerous elements, including the size, age, and area of the hematoma and the medicinal and neurologic state of the patient. Surgery might be critically required, yet even crisis surgery does not ensure an agreeable result [12]. Surgery for Chronic Subdural Hematomas may likewise be demonstrated if the hematoma is symptomatic or is delivering noteworthy mass impact, as assessed with diagnostic imaging. Diagnostic imaging that demonstrates an extending hematoma may likewise show the requirement for surgery, even in a few patients whose neurological status is close ordinary (Figure 3).

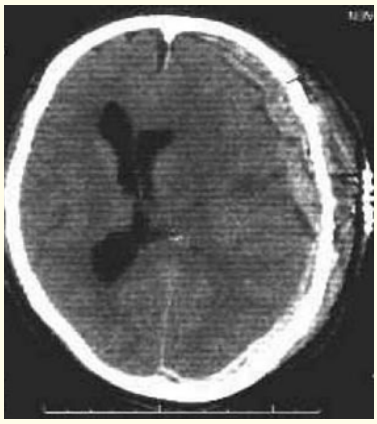

Figure 3: *CT of an acute subdural hematoma (ASDH) as a impediment of a craniotomy.*

Contraindications for surgery are resolved on a case-by-case basis, contingent upon factors that identify with the patient's neurologic and restorative condition. For instance, a patient with a monstrous subdural hematoma (SDH) may not be a surgical applicant on the off chance that he or she has attendant brain demise, expected extreme neurologic harm, coexisting brain lesions (localized necrosis), or a restorative condition that contraindicates general anesthesia or surgery (Coagulopathy before amendment). Also, what is known about the patient's and family's convictions and guidelines may assume a part in this choice. At the other end of the spectrum, small acute SDHs thinner than 5 mm on axial computed tomography (CT) images without sufficient mass effect to cause midline shift or neurologic signs may be able to be observed clinically. Magnetic resonance imaging (MRI) may be more sensitive than CT in detecting small SDHs (Figure 4). CSDH with negligible or no mass impact on imaging ponders and no neurologic side effects or signs aside from gentle cerebral pain is frequently seen with serial sweeps and may resolve without surgical intercession.

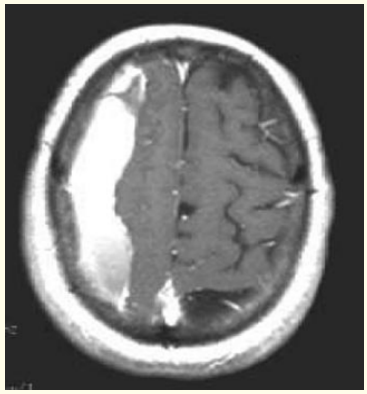

Figure 4: *Magnetic resonance imaging (MRI) for Isodense subdural hematoma.*

Surgical Treatment

Even though surgical treatment might have the capacity to effectively expel the hematoma itself, patients with ASDH are frequently hard to treat and may have a poor result because of fundamental cerebrum damage. The therapeutic issues, particularly in more established patients with SDHs, might be unpredictable [13]. Concerning timing, the aphorism "the sooner the surgery is done, the better" may not generally be exact. This is for different reasons, and it relies upon the individual case. Decades back, Wilberger., *et al*. presumed that "the time from damage to agent departure of the intense SDH concerning result horribleness and mortality was not factually critical when analyzed at hourly interims. Nevertheless, in patients with ASDH and signs for surgery, surgical clearing ought to be executed as quickly as time permits [11].

Craniotomy

Surgery to manage an acute subdural hematoma usually contains of a large craniotomy (centered over the thickest portion of the clot) to decompress the brain; to stop any active subdural bleeding; and if specified, to evacuate intraparenchymal hematoma in the immediate vicinity of the acute subdural hematoma. A subdural hematoma usually has a dependability that is too strong to permit removal through burr holes alone. Including the sylvian fissure in the craniotomy exposure must be taken into consideration, as this is a likely location of a ruptured cortical vessel. If brain injury and edema are allied with the subdural hematoma usually, an intracranial pressure (ICP) monitor may have to be located. Bullock., *et al*. [11,14] stated that "all patients with ASDH in coma, Glasgow coma scale [GCS] score less than 9 must go through intracranial pressure monitoring.

In specific situations, craniotomy is suggested for chronic subdural hematoma, contingent upon components, for example, repeat, the consistency of the hematoma, and the nearness of layers.

Craniectomy

Craniectomy (the removal of the bone plate or flap) is similarly sometimes essential, as when increased ICP exists or predicted. Different approaches for storing the bone flap for promising later replacement occur.

Twist-drill craniotomy

Drainage via twist-drill craniotomy at the bedside has additionally been depicted [15]. For twist drill craniotomy, an opening is bored at a 45° edge to the skull over the thickest piece of the hematoma unless this lies over the motor strip. The wind bore is utilized to puncture the dura and to discharge the subdural hematoma. A thin elastic catheter is tenderly guided into the subdural space, burrowed under the scalp, and brought out through a wound entry point. It is associated with a closed drainage system that is set at the level of the ear or somewhat underneath the craniotomy. Hwang., *et al*. [16] assessed outer carotid angiograms and skull radiographs to build up an ideal section point for contort bore craniotomy. Subsequent to finding that all branches of the center meningeal course and vascular scores were found back to the coronal suture, they established that the ideal passage point ought to be 1 cm foremost to the coronal suture at the level of the unrivaled transient line. In the mid-2000s, the Subdural Evacuating Port System (SEPS) was presented, with introductory empowering comes about [17]. In 2010, Kenning., *et al* and Rughani., *et al*. distributed their outcomes in utilizing this framework to treat SDHs.

Rughani., *et al.* [18] detailed that SEPS treatment for CSDH had a comparative adequacy and wellbeing contrasted with other wind penetrate techniques, and its viability was likewise factually like trephination (burr hole), as measured by radiographic declining or for requirement for another strategy. There was a pattern toward higher repeat with SEPS, yet there was no distinction in mortality or other unfavorable results. Kenning., *et al.* [19] discovered not only that SEPS was harmless and effective in the treatment of subacute and CSDHs but also that it would be perfect for patients incapable to tolerate general anesthesia (elderly, sick patients). Furthermore, SEPS was more effective in draining SDHs that were hypodense on computed tomography (CT) than it was in evacuating mixed-density SDHs. Even though one patient required urgent surgical subdural collection evacuation following iatrogenic injury, Kenning., *et al*. prominent that significant bleeding was infrequent with SEPS insertion.

Trephination

Liquefied SDHs are normally treated with waste through maybe a couple burr-hole put over the thickest parts of the hematoma. Numerous specialists put frontal and parietal burr openings that later can be fused into a frontotemporoparietal craniotomy, if necessary. The dura is opened in a cruciate manner, and the dural leaves are coagulated. A thin elastic catheter, frequently a ventriculostomy catheter, is deliberately put in the subdural space. Lingering SDH is tenderly inundated with saline arrangement until the irrigant is clear. The elastic catheter is diverted to various ranges of the subdural space to water the hematoma. Frequently, the cerebrum does not reexpand immediately. In these conditions, the elastic catheter might be burrowed under the skin and left as a subdural deplete. It is then associated with a shut drainage framework set at the level of the ear or a bit lower. A shut waste framework might be left in the subdural space for 24 - 72 hours postoperatively.

Santarius., *et al*. [20] found that positioning of drains after drainage of CSDHs decreases repeat and enhances clinical result. Their randomized controlled trial in 269 grown-up patients with a CSDH for burr- hole drainage was ceased early in view of a critical advantage in lessening of repeat with drain position. Hematomas repeated in 10 of 108 (9.3%) patients with a drain contrasted and 26 of 107 (24%) patients without a drain. At a half year, mortality was 8.6% in treated patients and 18.1% in controls.

Bilateral CSDHs may require drainage from the two sides, for the most part amid a similar operation by methods for burr hole s set on each side of the head (Figure 5). Be that as it may, the repeat rate of chronic hematoma after surgical clearing stays in any event at 30%, and utilization of glucocorticoids to bring down the occurrence of this difficulty stays disputable in spite of a long history. A multicenter stage III trial that will assess the viability of dexamethasone for decreasing the reoperation rate of perpetual SDH is the DRESH think about, which was booked to begin in Austria and China in February 2014 [21].

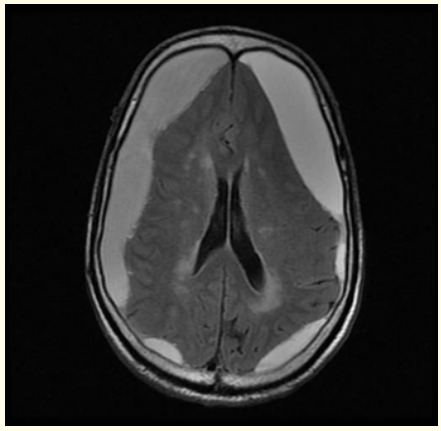

Figure 5: *Bilateral Chronic subdural hematomas (CSDH).*

Endoscopic Treatment

Endoscopic treatment is specified in removal of solid clots under direct vision in organized and multiloculated CSDH [22]. Endoscopic treatment can make the process safer with improved intraoperative visualization. It can permit the identification and destruction of neomembranes.

Postoperative Care for Acute subdural hematoma

After the evacuation of an acute subdural hematoma (ASDH), medicinal treatment is meant for keeping the ICP beneath 20 mm Hg and keeping up the cerebral perfusion weight over 60 - 70 mm Hg. On the off chance that raised ICP is an issue postoperatively, a critical CT

output ought to be gotten to search for another intracranial mass sore or reaccumulation of the SDH. Serial neurologic examinations are utilized to decide the patient's ensuing clinical course (regardless of whether the patient is steady, enhancing, or disintegrating). Contingent upon the seriousness of the neurologic damage, patients may require exercise based recuperation, word related treatment, long haul restoration, or notwithstanding nursing-home position.

A subsequent CT examine is generally gotten inside 24 hours of intense subdural gathering evacuation and as expected to screen for remaining hematoma and repeat. In spite of the fact that CT imaging alone is normally adequate for short-term administration, MRI of the brain is in some cases utilized to search for related cerebrum wounds.

Serial imaging studies might be important to affirm that the intense SDH has completely settled; a lingering hematoma could turn into a symptomatic endless subdural gathering. This change can happen notwithstanding of whether the hematoma has been overseen surgically or moderately. Postoperative coagulation studies (prothrombin time [PT], activated partial thromboplastin time [aPTT]) and platelet counts must be observed closely; likely, adjustments should be made to minimize the hazard of additional bleeding.

Complications of subdural hematoma

Subdural hematoma can be associated with recurrence, infection, new intracranial hematoma, seizure, cerebral edema, tension pneumocephalus, and failure of the brain to expand because of cranio-cerebral disproportion [23]. While there is a possible danger of pneumocephalus after all surgical methods in the treatment of SDH, it is seen in 11% of cases [24]. Tension pneumocephalus can happen after evacuation of a SDH. The amount of subdural air is correlated negatively with the resolution of subdural hematoma. It obstructs the adhesion between the inner and outer membranes, prolonging the widening of the subdural space, therefore endorsing postoperative reaccumulation. The subgaleal or subdural drain can reduce recurrences by preventing the collection of subdural air. Intraoperative saline flushing, positioning of burr hole at the highest point on the skull, and avoiding nitrous oxide anesthesia could help in preventing pneumocephalus. The risk of pneumocephalus may be reduced by the skin closure immediately after cessation of spontaneous blood efflux. Valsalva maneuver and use of gravity in 30° Trendelenburg position, instead of suction, are helpful in avoiding pneumocephalus. Brain herniation through membrane can also be seen. Microorganisms like *Klebsiella pneumoniae* may directly infect the subdural space [25].

Parenchymal cerebrum damage is generally connected with acute subdural hematoma (SDH) and can prompt increased intracranial pressure (ICP). Lingering neurologic issues, and also auxiliary occasions, can come about because of these related wounds.

Likewise with each restorative condition and treatment, inborn dangers exist. Postoperatively, intermittent or remaining hematoma may be available, which, if symptomatic, may require rehash agent intercession. Upwards of 33% of patients encounters posttraumatic seizures after extreme head damage. Wound contamination and cerebrospinal fluid spill are conceivable after craniotomy. Meningitis or cerebral sore can happen after any intracranial system, and sacred indications of disease, deferred neurologic crumbling, or indications of meningeal bothering may require assist assessment.

Conclusion

Despite the fact that the surgical treatment has a clear cut sign in the greater part of the cases, the way that there are numerous surgical methods, a higher relapse rate, and the various examinations that endeavor to feature the productivity of a procedure over another, it exhibits that the treatment of these haematomas is a long way from achieving an accord among the neurosurgeons. In any case, It is clear that the motivation behind the treatment is to be insignificantly intrusive and, in a similar time, to reduce the rate of relapses.

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