

**CONCLUSION
AND
RECOMMENDATIONS**

CONCLUSION AND RECOMMENDATIONS

- Postoperative midline shifting (≥ 5 mm) and preoperative width of hematoma (≥ 20 mm) are independent predictors for the recurrence of CSDH. This information might be helpful for predicting the recurrence of CSDH.
- Larger amounts of residual air in the postoperative hematoma cavity were associated with high rates of recurrence of CSDH. Intraoperative air invasion to the hematoma cavity should be avoided to prevent recurrence.
- Adequate and complete evacuation of the CSDH, thorough and liberal saline wash to remove the residual semi solid component and refilling the subdural cavity with saline to prevent the influx of air into the subdural space reduce the recurrence rate in the treatment of CSDH.
- Anticoagulant and antiplatelet therapies are more prevalent among non-traumatized CSDH patients. This underlines the importance of awareness for the potential risk of CSDH development and post-operative recurrence after burr hole evacuation of CSDH among older people with cardiovascular co-morbidity.
- In adequately anti-coagulated patients, anticoagulant therapy is an independent risk factor for recurrence.
- CSDH is classified radiologically into four types according to internal architecture, which corresponded to possible stages in the natural history of CSDH: homogeneous, laminar, separated, and trabecular types. In The separate and laminar types, the hyperfibrinolytic activity and tendency to re-bleed from the neo-membrane is high and thus associated with high rates of recurrence. On the other hand, the rate of recurrence was significantly lower in the homogeneous and the trabecular type than the in the laminar and separated type.
- Avoidance of wrong timing of operation in the laminar type of CSDH can be useful. Again, in case of separate and laminar types of CSDH on CT scan, the surgery can be delayed unless severe symptoms are present.
- Post-operative position is not an independent risk for recurrence of CSDH. Early mobilization without attending the flat position of the head after burr-hole surgery for CSDH prevents postoperative complications without increasing the risk of recurrence although, theoretically bed rest in flat position and appropriate fluid administration may prevent hematoma recurrence by facilitation of brain re-expansion.
- Age and sex are not independent risk factors for recurrence of CSDH.
- The frequency of focal neurological deficits was found to be lesser in patients with bilateral CSDH, and this may confound the diagnosis and delay the treatment. Therefore, early surgical decompression of bilateral mass lesions should be implemented to prevent rapid neurological deterioration. Although there is no difference in the eventual neurological outcomes, it is important for clinicians to be aware of the higher incidence of recurrence in patients with bilateral CSDH.

- Pre-operative Glasgow Coma Scale and post-operative outcome scale score are not risk factors for recurrence of CSDH.
- Complete resolution of SDH fluid and re-expansion of the compressed brain are both very slow and steady and require at least 10 to 20 days Therefore, a persistent fluid accumulation on a CT scan performed after surgery is no indication for a second surgical procedure unless the patient shows no recovery at all or deteriorates markedly so do not treat persistent fluid collections evident on CT (especially before 20 days post-op) unless it increases in size on CT or if the patient shows no recovery or deteriorates.
- Additional surgical procedures such as repeated tapping of chronic SDH fluid and craniotomy and membranectomy should not be evaluated earlier than 20 days after the initial operative intervention.

REFERENCES

REFERENCES

1. Cooper PR. Traumatic intracranial hematomas in Neurosurgery. In: Wilkins RH, Rengachary SS (eds). McGraw: Hill Book Company, 1985. 1660.
2. Weir BK, Goran P. Factors affecting coagulation, fibrinolysis in chronic subdural fluid collection. *J Neurosurg* 1983; 58: 242-5.
3. Davies DV, Couplant RE. *Gray's Anatomy*, 1972.
4. Last R. *Anatomy Regional and Applied*, 7th ed. Edinburgh: Longman Group, 1973.
5. Auer LM, Gallhofer B, Ladurner G, Sager WD, Heppner F, Lechner H. Diagnosis and treatment of middle fossa arachnoid cysts and subdural hematomas. *J Neurosurg* 1981; 54: 366-9.
6. Barlett RC, Lemmon LJ. Subdural hematoma associated with bleeding intracranial aneurysm. *J Neurosurg* 1952; 9: 433, 450.
7. Boop WC Jr, Chou SN, French LA. Ruptured intracranial aneurysm Complicated by subdural hematoma. *J Neurosurg* 1961; 18: 834-6.
8. Luken MG III, Whelan MA. Recent diagnostic experience with subdural empyema. *J Neurosurg* 1980; 52: 764-71.
9. Cusick JF, Bailet OT. Association of ossified subdural hematomas and meningiomas. Case report. *J Neurosurg* 1972; 37: 731-4.
10. Davidoff IM, Feiring EH. Subdural hematoma occurring in surgically treated hydrocephalic children. *J Neurosurg* 1953; 10: 557-63.
11. Farrest DM, Cooper DGW. Complication of ventriculo-atrial shunt. A view of 455 cases. *J Neurosurg* 1968; 29: 506-12.
12. IInigworth RD. Subdural hematoma after treatment of chronic hydrocephalus by ventriculo-atrial shunt. *J Neurol Neurosurg psychiatry* 1970; 33: 95-9.
13. Aronson SM, Okazaki H. A study of some factors modifying response of cerebral tissue to subdural hematoma. *J Neurosurg* 1963; 20: 89-93.
14. Markwalder TM. Chronic subdural hematoma: A review. *J Neurosurg* 1981; 54: 637-45.
15. Edson JR, McArthur JR, Branda RF, McCullough JJ, Chou SN. Successful management of subdural hematoma in a hemophilic with an anti. Factor VIII antibody. *Blood* 1973; 41: 113-22.
16. Chan KH, Mann KS, Chan TK. The significance of thrombocytopenia in development of post-operative intracranial hematoma. *J Neurosurg* 1989; 71: 39-41.
17. Ito H, Yamamoto S, Komai T, Mizukoshi H. The role of local hyperfibrinolysis in the etiology of chronic subdural hematoma. *J Neurosurgery* 1976; 45: 26-31.
18. Dandy WE. *The brain*. New York: Haeber Medical, 1969. 280-91.
19. Apfelbaum RI, Guthkelch AN, Shulman K. Experimental production of subdural hematomas. *J Neurosurgery* 1974; 40: 336-46.
20. Rabe EF, Flynn RE, Dodge AR. A study of subdural effusions in an infant with particular reference to the mechanism of their persistence. *Neurology* 1962; 12: 79-92.

21. Weir B. The osmolarity of subdural hematoma fluid. *Neurosurg* 1971; 34: 528-33.
22. Suzuki J, Takaku A. Neurosurgical treatment of chronic subdural hematoma. *J Neurosurg* 1970; 33: 548-53.
23. Gjerris F, Schnmidt K. Chronic subdural hematoma surgery and mannitol treatment. *J Neurosurg* 1974; 40: 639-42.
24. Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural hematomas that influence their post-operative recurrence. *J Neurosurg* 2001; 95: 256-62.
25. Satto S, Suzuki J. Ultrastructural observation of the capsule of chronic subdural hematoma in various clinical stages. *J Neurosurg* 1973; 43: 569-78.
26. Cameron MM. Chronic subdural hematoma: A review of 114 cases. *Journal of Neurology. Neurosurg psychiatry* 1978; 41: 834-9.
27. Anderson FM. Subdural hematoma, a complication of operation for hydrocephalus. *Pediatrics* 1932; 10: 11-8.
28. Moussa AH, Sharma SK. Subdural hematoma and malfunctioning shunt. *J Neurol Neurosurg Psychiatry* 1978; 41: 756-61.
29. Calkins RA, Van Allen MW, Sahs AL. Subdural hematoma following pneumoencephalography. Case report. *J Neurosurg* 1967; 27: 561.
30. Diamond T, Gray WJ, Chee CP, Fannin TF. Subdural haematoma associated with long term oral anticoagulation. *Br J Neurosurg* 1988; 2: 351-5.
31. Leonard CD. Subdural hematoma and dialysis: Survey of reprint requests. *New Eng J Med* 1970; 282: 1433.
32. Komatsu S, Takaku A, Hori S. Three cases of chronic subdural hematoma developing after direct aneurysmal surgery (author's transl). *No Shinkei Geka* 1977; 5: 1273-7.
33. Hostain W. Subdural hematoma associated with congenital intracranial aneurysms. *J Neuroradiol* 1978; 15: 113.
34. Charles LY. Prostatic adenocarcinoma metastatic to chronic subdural hematoma membranes *J Neurosurg* 1988; 68: 642-4.
35. Kaste M, Waltino O, Herskanen O. Chronic bilateral subdural hematoma in adults. *Acta Neurochi (Wein)* 1979; 48: 231-6.
36. Galicich JH, Arbit E. Metastatic brain tumors. In: Youmans Neurological surgery. W.B. Saunders, 3204-11. 1990.
37. Luxon LM, Harrison MJ. Chronic subdural hematoma. *Q J Med* 1979; 48: 43-53.
38. Melamed E, Lavys Reches H, Sahor A. Chronic subdural hematoma simulating transient ischemic attacks. Case report. *J Neurosurg* 1975; 42: 101-3.
39. Ogsbury JS, Schneck SA, Lehman RA. Aspects of interhemispheric subdural hematoma including falx syndrome. *J Neurol Neurosurg Psychiatry* 1978; 41: 72-5.
40. Aoki N. Chronic subdural hematoma, in infancy. *J Neurosurg* 1990; 73: 201-5.

41. Shenkin HA. Acute subdural hematoma. Review of 39 consecutive cases with high incidence of cortical artery rupture. *J Neurosurg* 1982; 57: 254-7.
42. Bunuel LG. Computerized Tomography and subdural hematoma. *Lancet* 1979; 1: 110.
43. Asari S, Kunishio K, Suga M, Satoh T, Sunami N, Yamamoto Y, et al. Coronal computerized angiography for the diagnosis of isodense chronic subdural hematoma. *J Neurosurg* 1984; 61: 729-32.
44. Markwalder TM, Steinsiepe KF, Rohner M, Reichenbach W, Markwalder H. The course of chronic subdural hematoma after burr hole craniostomy and closed system drainage. *J Neurosurg* 1981; 55: 390-6.
45. Kao MC. Sedimentation level in chronic subdural hematoma visible on computerized Tomography. *J Neurosurg* 1983; 58: 246-51.
46. Marcu H, Becker H. Computed-tomography of bilateral isodense chronic subdural hematoma *Neuroradiology* 1977; 14: 81-3.
47. Taveras JM, Weed EH. *Diagnostic Neuroradiology*. 2nd ed. Vol I. Williams and Williams Co, 1976.
48. Hosoda K, Tamaki N, Masumura M, Matsumoto S, Maeda F. Magnetic resonance image of chronic subdural hematoma. *J Neurosurg* 1987; 67: 677-83.
49. Stone JL, Lang RGR, Sugar O. Traumatic subdural hygroma. *Neurosurgery* 1997; 8: 542-7.
50. Drapkin AJ. Chronic subdural hematoma: patho-physiological basis of treatment. *Br J Neurosurg* 1991; 5: 467-73.
51. Robinson RG. Chronic subdural hematoma: surgical management in 133 patients. *J Neurosurg* 1984; 61: 263-8.
52. Camel M, Grupp R L. treatment of chronic subdural hematoma by twist drill-craniostomy with continuous catheter drainage. *J Neurosurg* 1986; 65: 183-7.
53. Hubschmann OR. Twist drill craniostomy in the treatment of chronic and subacute hematomas in severely ill and elderly patients. *Neurosurgery* 1980; 6: 233-6.
54. Tabaddor K, Shulman K. Definitive treatment of chronic subdural hematoma by twist-drill craniostomy and closed-system drainage. *J Neurosurg* 1977; 46: 220-6.
55. Tyson G, Strachan WE, Newman P, Winn HR, Butler A, Jane J. The role of craniotomy in the treatment of chronic subdural hematoma. *J Neurosurg* 1980; 52: 776-81.
56. Hamilton MG, Frizzell JB, Tranmer BI. Chronic subdural hematoma: the role for craniotomy reevaluated. *Neurosurgery* 1993; 33: 67-72.
57. Lind CR, Lind GJ, Mee EW. Reduction in the number of repeated operations for the treatment of subacute and chronic subdural hematomas by placement of subdural drains. *J Neurosurg* 2003; 99: 44-6.
58. Abouzari M, Rashidi A, Rezaii J, Esfandiari K, Asadollahi M, Aleali H, et al. The role of post-operative patients posture in the recurrence of traumatic chronic subdural hematoma after burr hole surgery. *Neurosurgery* 2007; 61: 794-7.

59. Markwalder TM, Steinsiepe KF, Rohner M, Reichenbach W, Markwalder H. The course of chronic subdural hematomas after burr-hole craniostomy and closed system drainage. *J Neurosurg* 1981; 55: 390-6.
60. Arginteanu MS, Byun H, King W. Treatment of a recurrent subdural hematoma using urokinase. *J Neurotrauma* 1999; 16: 1235-9.
61. Aoki N, Mizutani H, Masuzawa H. Unilateral subdural peritoneal shunting for bilateral chronic subdural hematoma in infancy. *J Neurosurgery* 1985; 63: 134-7.
62. Collins WF, Pucci GL. Peritoneal drainage of subdural hematoma in infants. *J Pediatrics* 1961; 58: 482-5.
63. Moyes PD, Thompson GB, Cluff JW. Subdural peritoneal shunt in the treatment of subdural effusion in infants. *J Neurosurg* 1975; 23: 584-7.
64. Shulman K, Ransohoff J. Subdural hematoma in children. The fate of children with retained membranes. *J Neurosurgery* 1961; 18: 175-81.
65. Perret GE, Graf CJ. Subgaleal shunt for temporary ventricular decompression and subdural drainage. *J Neurosurgery* 1977; 47: 590-5.
66. Chon KH, Lee JM, Koh EJ, Choi HY. Independent predictors for recurrence of chronic subdural hematoma *Acta Neurochir* 2012; 154: 1541-8.
67. Amirjamshidi A, Abouzari M, Eftekhari B, Rashidi A, Rezaii J, Esfandiari K, et al. Outcomes and recurrence rates in chronic subdural hematoma. *Br J Neurosurg* 2007; 21: 272-5.
68. Fukuhara T, Gotoh M, Asari S, Ohmoto T, Akioka T. The relationship between brain surface elastance and brain re-expansion after evacuation of chronic subdural hematoma. *Surg Neurol* 1996; 45: 570-4.
69. Nagatani K, Takeuchi S, Sakakibara F, Otani N, Nawashiro H. Radiological factors related to recurrence of chronic subdural hematoma. *Acta Neurochir (Wien)* 2011; 153: 1713.
70. Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural hematomas that influence their postoperative recurrence. *J Neurosurg* 2001; 95: 256-62.
71. Oishi M, Toyama M, Tamatani S, Kitazawa T, Saito M. Clinical factors of recurrent chronic subdural hematoma. *Neurol Med Chir (Tokyo)* 2001; 41: 382-6.
72. Santarius T, Kirkpatrick PJ, Ganesan D, Chia HL, Jalloh I, Smielewski P, et al. Use of drains versus no drains after burr-hole evacuation of chronic subdural hematoma: a randomised controlled trial. *Lancet* 2009; 374: 1067-73.
73. Scotti G, Terbrugge K, Melancon D, Belanger G. Evaluation of the age of subdural hematomas by computerized tomography. *J Neurosurg* 1977; 47: 311-5.
74. Torihashi K, Sadamasa N, Yoshida K, Narumi O, Chin M, Yamagata S. Independent predictors for recurrence of chronic subdural hematoma: a review of 343 consecutive surgical cases. *Neurosurgery* 2008; 63: 1125-9.

75. Yamamoto H, Hirashima Y, Hamada H, Hayashi N, Origasa H, Endo S. Independent predictors of recurrence of chronic subdural hematoma: results of multivariate analysis performed using a logistic regression model. *J Neurosurg* 2003; 98: 1217–21.
76. Lindvall P, Koskinen LO. Anticoagulants and antiplatelet agents and the risk of development and recurrence of chronic subdural hematomas. *J Clin Neurosci* 2009; 16: 1287-90.
77. Spallone A, Giuffre R, Gagliardi FM, Vagnozzi R. Chronic subdural hematoma in extremely aged patients. *Eur Neurol* 1989; 29: 18-22.
78. Oyama H, Ikeda A, Inoue S, Shibuya M. The relationship between coagulation time and bilateral occurrence in chronic subdural hematoma. *No To Shinkei* 1999; 51: 325-30.
79. Mauser HW, Ravijst RA, Elderson A, van Gijn J, Tulleken CA. Nonsurgical treatment of subdural empyema. Case report. *J Neurosurg* 1985; 63: 128-30.
80. Modesti LM, Hodge CJ, Barnwell ML. Intracerebral hematoma after evacuation of chronic extra cerebral fluid collections. *J Neurosurg* 1982; 10: 689-93.
81. Sharma BS, Tewari MK, Khosla VK, Pathak A, Kak VK. Tension pneumocephalus following evacuation of chronic subdural hematoma. *J Neurosurg* 1989; 3: 381-7.
82. Ishiwata Y, Fujitsu K, Sekino T, Fujino H, Kubokura T, Tsubone K, et al. Subdural tension pneumocephalus following surgery for chronic subdural hematoma. *J Neurosurg* 1988; 68: 58-61.
83. Tabaddor K, Shulmon K. Definitive treatment of chronic subdural hematoma by twist drill craniostomy and closed system drainage. *J Neurosurg* 1977; 46: 220-6.
84. Bremer AM, Nguyen TQ. Tension pneumocephalus after surgical treatment of chronic subdural hematoma. *J Neurosurg* 1982; 11: 284-7.
85. Hernansanz J, Muñoz F, Rodríguez D, Soler C, Principe C. Subdural hematomas of the posterior fossa in normal-weight newborns. Report of two cases. *J Neurosurg* 1984; 61: 972-4.
86. Black PM, Ojemann RG. Hydrocephalus in adult. In: Youmans JR. *Youmans neurological surgery*. 3rd ed. New York: W.B. Saunders, 1990. 1281-3.
87. Furui T, Yamada A, Iwata K. Subdural hematoma as a complication of hemostatic deficiency secondary to liver cirrhosis--report of two cases. *Neurol Med Chir (Tokyo)* 1989; 29: 588-91.
88. Sakas DE, Krassanakis KC. Asymmetrical hydrocephalus following evacuation of a subdural hematoma. *J Neurosurg* 1987; 4: 495-8.
89. Adhiyaman V, Asghar M, Ganeshram KN, Bhowmick BK. Chronic subdural hematoma in the elderly. *Postgrad Med J* 2002; 78: 71-5.
90. Fogelholm R, Waltimo O. Epidemiology of chronic subdural haematoma. *Acta Neurochir (Wien)* 1975; 32: 247-50.
91. Kurabe S, Ozawa T, Watanabe T, Aiba T. Efficacy and safety of postoperative early mobilization for chronic subdural hematoma in elderly patients. *Acta Neurochir (Wien)* 2010; 152: 1171-4.

92. Nakaguchi H, Tanishima T, Yoshimasu N. Relationship between drainage catheter location and postoperative recurrence of chronic subdural hematoma after burr-hole irrigation and closed-system drainage. *J Neurosurg* 2002; 93: 791-5.
93. Stanistic M, Lund-Johansen M, Mahesparan R. Treatment of chronic subdural hematoma by burr-hole craniostomy in adults: influence of some factors on postoperative recurrence *Acta Neurochir (Wien)* 2005; 147: 1249-56.
94. Cattaneo M. Aspirin and clopidogrel: efficacy, safety, and the issue of drug resistance. *Arterioscler Thromb Vasc Biol* 2004; 24: 1980-7.
95. Rust T, Kiemer N, Erasmus A. Coagulation or anti-thrombotic therapy. *J Clin Neurosci* 2006; 13: 823-7.
96. König SA, Schick U, Döhnert J, Goldammer A, Vitzthum HE. Coagulopathy and outcome in patients with chronic subdural hematoma. *Acta Neurol Scand* 2003; 107: 110-6.
97. Frati A, Salvati M, Mainiero F, Ippoliti F, Rocchi G, Raco A, et al. Inflammation markers and risk factors for recurrence in 35 patients with a posttraumatic chronic subdural hematoma: a prospective study. *J Neurosurg* 2004; 100: 24-32.
98. Fujisawa H, Ito H, Saito K, Ikeda K, Nitta H, Yamashita J. Immunohistochemical localization of tissue-type plasminogen activator in the lining wall of chronic subdural hematoma. *Surg Neurol* 1991; 35: 441-5.
99. Fujisawa H, Nomura S, Tsuchida E, Ito H. Serum protein exudation in chronic subdural hematoma: a mechanism for hematoma enlargement. *Acta Neurochir (Wien)* 1998; 140: 161-6.
100. Murakami H, Hirose Y, Sagoh M, Shimizu K, Kojima M, Gotoh K, et al. Why do chronic subdural hematomas continue to grow slowly and not coagulate? Role of thrombomodulin in the mechanism. *J Neurosurg* 2002; 96: 877-84.
101. Nakamura S, Tsubokawa T. Extraction of angiogenesis factor from chronic subdural hematomas. Significance in capsule formation and hematoma growth. *Brain Inj* 1989; 3: 129-36.
102. Suzuki M, Endo S, Inada K, Kudo A, Kitakami A, Kuroda K, et al. Inflammatory cytokines locally elevated in chronic subdural hematoma. *Acta Neurochir (Wien)* 1998; 140: 51-5.
103. Vaqueros J, Zurita M, Cincu R. Vascular endothelial growth permeability factor in granulation tissue of chronic subdural hematomas. *Acta Neurochir (Wien)* 2002; 144: 343-7.
104. Nomura S, Kashiwagi S, Fujisawa H, Ito H, Nakamura K. Characterization of local hyperfibrinolysis in chronic subdural hematomas by SDS-PAGE and immunoblot. *J Neurosurg* 1994; 81: 910-3.
105. Choudhury AR. Avoidable factors that contribute to complications in the surgical treatment of chronic subdural haematoma. *Acta Neurochir (Wien)* 1994; 129:15-9.
106. Miele VJ, Sadrolhefazi A, Bailes JE. Influence of head position on the effectiveness of twist drill craniostomy for chronic subdural hematoma. *Surg Neurol* 2005; 63: 420-3.

107. Nakajima H, Yasui T, Nishikawa M, Kishi H, Kan M. The role of postoperative patient posture in the recurrence of chronic subdural hematoma: a prospective randomized trial. *Surg Neurol* 2002; 58: 385-7.
108. Svien HJ, Gelety JE. On the surgical management of encapsulated subdural hematoma. A comparison of the results of membranectomy and simple evacuation. *J Neurosurg* 1964; 21: 172-7.
109. Miele VJ, Sadrolhefazi A, Bailes JE. Influence of head position on the effectiveness of twist drill craniostomy for chronic subdural hematoma. *Surg Neurol* 2005; 63: 420-3.
110. Matsumoto K, Akagi K, Abekura M, Ryujin H, Ohkawa M, Iwasa N, et al. Recurrence factors for chronic subdural hematomas after burr-hole craniostomy and closed system drainage. *Neurol Res* 1999; 21: 277-80.
111. Tsutsumi K, Maeda K, Iijima A, Usui M, Okada Y, Kirino T. The relationship of preoperative magnetic resonance imaging findings and closed system drainage in the recurrence of chronic subdural hematoma. *J Neurosurg* 1997; 87: 870-5.
112. Huang YH, Yang KY, Lee TC, Liao CC. Bilateral chronic subdural hematoma: What is the clinical significance? *Int J Surg* 2013; 11: 544-8.
113. Amirjamshidi A, Eftekhari B, Abouzari M, Rashidi A. The relationship between Glasgow coma/outcome scores and abnormal CT scan findings in chronic subdural hematoma. *Clin Neurol Neurosurg* 2007; 109: 152-7.
114. Amirjamshidi A, Abouzari M, Rashidi A. Glasgow Coma Scale on admission is correlated with postoperative Glasgow Outcome Scale in chronic subdural hematoma. *J Clin Neurosci* 2007; 14: 1240-1.

PROTOCOL

ASSESSMENT OF FACTORS AFFECTING RECURRENCE
OF CHRONIC SUBDURAL HEMATOMA

تقييم العوامل المؤثرة على النزيف المزمن المرتجع تحت الأم الجافية

Protocol of a thesis submitted
to the Faculty of Medicine
University of Alexandria
In partial fulfilment of the
requirements of the degree of
Master of Surgery

خطة بحث مقدمة
لكلية الطب
جامعة الإسكندرية
إيفاء جزئياً
لشروط الحصول علي درجة
الماجستير في الجراحة

من

Abuel Rahman Magdy El Habashy Ragab
MBBCh, Alex.
Resident
Alexandria University Hospitals
Department of Neurosurgery
Faculty of Medicine
University of Alexandria
2014

عبد الرحمن مجدى الحبشى رجب
بكالوريوس الطب والجراحة، الإسكندرية
طبيب مقيم
مستشفيات جامعة الإسكندرية
قسم جراحة المخ والأعصاب
كلية الطب
جامعة الإسكندرية
٢٠١٤







المشرفون

SUPERVISORS

Prof. Dr. Alaa El Din Mohamed Issa

Professor of Neurosurgery,

Faculty of Medicine,

University of Alexandria.

أ.د/ علاء الدين محمد عيسى

أستاذ جراحة المخ والأعصاب

كلية الطب

جامعة الإسكندرية

Dr. Hesham Adel Abo El Eneen

Assistant Professor of Neurosurgery,

Faculty of Medicine,

University of Alexandria.

د/ هشام عادل ابو العنين

أستاذ مساعد جراحة المخ والأعصاب

كلية الطب

جامعة الإسكندرية

CO-SUPERVISOR

المشرف المشارك

Dr. Wael Mahmoud Khedr

Lecturer in Neurosurgery,

Faculty of Medicine,

University of Alexandria,

For his experience in the field of the study.

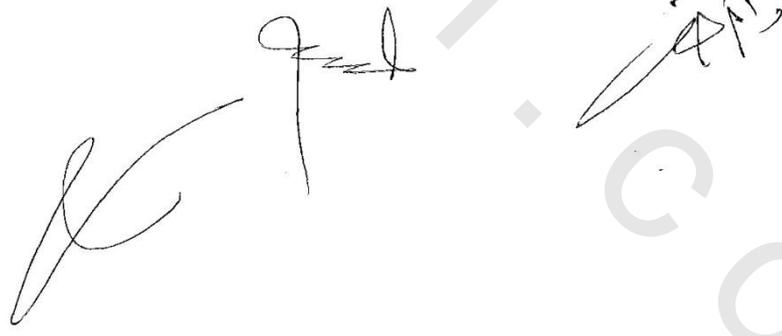
د/ وائل محمود خضر

مدرس جراحة المخ والأعصاب

كلية الطب

جامعة الإسكندرية

وذلك لخبرته في مجال البحث



ASSISTANT RESEARCHER

Sarah Mohamed Abd Elwahab

Fifth grade student

Faculty of Medicine

University of Alexandria

Phone Number: 01119785873

E-mail: sarah812@gmail.com

3.

الباحث المساعد

سارة محمد عبد الوهاب

طالبة بالفرقة الخامسة

كلية الطب

جامعة الإسكندرية

ساره

ساره

ساره

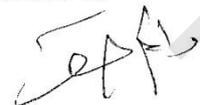
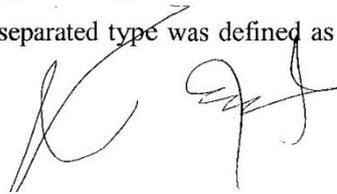
INTRODUCTION

Chronic subdural hematoma (CSDH) is a common disease in the elderly. The incidence of chronic subdural hematoma (CSDH) has been reported to be 3.4 per 100,000 in patients younger than 65 years of age, and 8–58 per 100,000 in those older than 65 years. ⁽¹⁾ Because of the continuing rise of life expectancy in the western world ⁽²⁾ and the increasing use of anticoagulants and antiplatelet aggregation agents (AAA), ^(2,3) the incidence of CSDH is expected to rise.

Some authors suggest that CSDH is not a benign disease in the elderly due to its recurrence rate and perioperative mortality rate. Numerous factors reportedly associated with recurrence of CSDH have been reported, but the factors influencing their recurrence have not been sufficiently investigated. ⁽⁴⁻⁶⁾

Previous studies have reported several factors that are associated with the recurrence of CSDH including age, bleeding tendency, postoperative position, preoperative Glasgow Coma Scale score, and Glasgow Outcome Scale score. Also several radiological factors have been reported according to computed tomography (CT) of the brain as hematoma density, width of the hematoma, postoperative midline displacement, postoperative subdural air collection and recurrent CSDH. ^(4,5,7)

CSDH was classified radiologically in computed tomography (CT) of the brain into four types according to internal architecture or density of the hematoma, which corresponded to possible stages in the natural history of CSDH: homogeneous, laminar, separated, and trabecular types. The homogeneous type was defined as a hematoma that exhibited homogeneous density (low–high). The laminar type was defined as a subtype of the homogeneous type that had a thin high-density layer along the inner membrane. The separated type was defined as a hematoma containing two components of

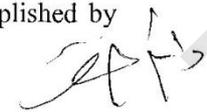


5.

different densities with a clear boundary lying between them; that is, a lower-density component located above a higher-density component. The trabecular type was defined as a hematoma within homogeneous contents and a high density septum running between the inner and outer membrane on a low-density to isodense background.⁽⁸⁾

Treatment of CSDH depends on clinical symptoms and the size of the hemorrhage. The standard treatment for CSDH is surgical evacuation, which usually results in great improvement of neurological symptoms. Three main surgical techniques exist for the evacuation of CSDH: burr-hole craniostomy (BHC), twist-drill craniostomy (TDC) and craniotomy.⁽⁹⁻¹¹⁾ Burr-hole craniostomy with a closed system drainage is the most popular surgical technique worldwide.^(12,13) BHC is associated with a lower rate of recurrence⁽¹⁾ and a lower rate of severe complications compared to TDC and craniotomy.⁽¹⁴⁾ The use of closed-system drainage following BHC has been reported to further reduce recurrence rate and mortality.⁽⁹⁾ Furthermore, a recurrence rate between 2.7 and 34 % has been reported.⁽¹³⁾

Considering the increasing number of aged patients who use antiplatelet and anticoagulant medications, attention should be focused on the possible risks of these treatments. Theoretically, it is plausible that the use of antiplatelets and anticoagulants has a positive influence on the recurrence of CSDH. In the previous studies, there was no association between medication with antiplatelets or anticoagulants and recurrence of CSDH.^(2,7) They concluded that the reason for this finding may be that the patients were not adequately anticoagulated, especially in the non-recurrence group.⁽⁷⁾ Patients suffering from CSDH while receiving anticoagulants and/or AAA have their medication discontinued in order to minimize the risk of further hematoma expansion. In emergency situations where immediate intervention is required, rapid reversal of anticoagulation is needed. Reversal of warfarin is generally accomplished by



6.

infusion of fresh frozen plasma (FFP), prothrombin complex concentrate or vitamin K and the reversal of AAA can be met by platelet transfusion.⁽¹⁵⁾ The role of anticoagulants and AAA in the development and recurrence of CSDH is unclear.^(2,3) Some Authors also reported an increased tendency to bilateral CSDH in patients under anticoagulant or antiplatelet therapy.⁽¹⁶⁾ Moreover, according to a recent study, both these therapies may affect the quality of life after the surgical treatment for CSDH.⁽¹⁷⁾

There are few studies on the laterality of CSDH. One of them reported that 18% of cases presented a bilateral distribution and 82%, unilateral. Among the unilateral, the left side was more frequent in a statistically significant manner (57.2%).⁽¹⁸⁾ Most clinicians consider bilateral CSDH equivalent to unilateral CSDH as there is no difference in the presentations or treatment outcomes. However, rapid and progressive aggravation of bilateral CSDH has been documented and the authors recommend operation as early as possible with simultaneous decompression of bilateral hematoma pressure.⁽¹⁹⁾

Handwritten signature

Handwritten signature

Handwritten signature

7.

AIM OF THE WORK

Assessment of independent predictors for recurrence of chronic subdural hematoma .This study will focus on the following assumed predictors which are age, sex, bleeding tendency, postoperative position of the patient, preoperative Glasgow Coma Scale score, and Glasgow Outcome Scale score. Also this study will discuss several radiological risk factors in CT brain as hematoma density, width of the hematoma, postoperative midline shift, postoperative subdural air collection and bilateral chronic subdural hematoma.

SAK

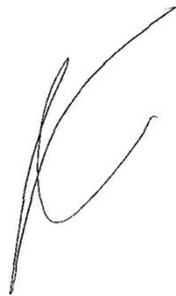
SAK

SAK

o b e k a n d i . c o m

PATIENTS

This study will be conducted on all patients operated for chronic subdural hematoma in Alexandria university hospital within one year starting from 1/9/2013 to 31/8/2014.



9.

METHODS

This study is a Prospective study on all patients operated for chronic subdural hematoma evacuation in Alexandria university hospital within one year starting from 1/9/2013 to 31/8/2014.

Upon admission, all patients will be subjected to thorough history taking with focus on intake of anticoagulants as aspirin or clexane. Clinical examination will be done with recording of the preoperative Glasgow Coma Scale score. Routine laboratory investigations as well as screening for any bleeding tendency will be done.

Diagnostic tool is CT brain to all patients. The hematoma will be radiologically into four types: homogenous, laminar, separated, and trabecular types. Again the hematoma will be classified either it is unilateral or bilateral.

The surgical procedure will be burr hole drainage with irrigation and subcutaneous closed system drainage. All patients will be positioned flat in the postoperative period and will be assessed clinically and the Glasgow Outcome Scale score will be recorded.

CT brain will be done immediately after admission, immediately postoperative to exclude residual subdural collection, two weeks after evacuation of the hematoma and six weeks after the surgery.

Postoperative CT brain will be analysed for postoperative midline shift and postoperative subdural air collection.



[Handwritten signature]

ETHICS OF RESEARCH

Research on human or human products:

Prospective study: Informed consent will be taken from patients. In case of incompetent patients the informed consent will be taken from the guardians.

Retrospective study: Confidentiality of records will be considered

Genetic and genomic material. Informed consent for DNA / genomic test and for research will be taken from patients. No further tests will be carried out except with further approval of committee and patients. If the samples will travel outside Egypt the researcher will be responsible for transportation and security approval.

All drugs used in the research are approved by the Egyptian Ministry of Health

Research on animal:

The animal species are appropriate for the test.

After test, if the animal will suffer, it will be euthanized and properly disposed.

After operation, it will have a proper postoperative care.

[Handwritten signature]

[Handwritten signature]

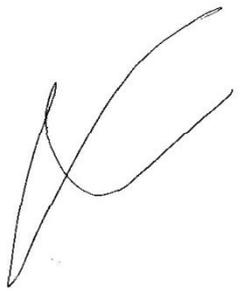
[Handwritten signature]

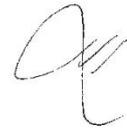


11.

RESULTS

The results of the present study will be recorded, tabulated and statistically analysed according to appropriate methods.



 12.

DISCUSSION

The results will be discussed in the view of achievement of the aim, their significance and their comparison with the results of the available literature.







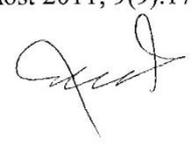
REFERENCES

1. Ducruet AF, Grobelny BT, Zacharia BE, Hickman ZL, DeRosa PL, Anderson K, et al. The surgical management of chronic subdural hematoma. *Neurosurg Rev* 2012; 35(2):155–69.
2. Lindvall P, Koskinen LO. Anticoagulants and antiplatelet agents and the risk of development and recurrence of chronic subdural haematomas. *J Clin Neurosci* 2009; 16:1287–90.
3. Forster M, Mathe A, Senft C, Scharrer I, Seifert V, Gerlach R. The influence of preoperative anticoagulation and the quality of life after surgical treatment of chronic subdural hematoma. *J Clin Neurosci* 2010; 17(8):975–9.
4. Abouzari M, Rashidi A, Rezaii EK, Asadollahi M, Aleali H, Abdollahzadeh M. The role of postoperative patient posture in the recurrence of traumatic chronic subdural hematoma after burr-hole surgery. *Neurosurg* 2007; 61:794–7.
5. Amirjamshidi A, Abouzari M, Eftekhar B, Rashidi A, Rezaii J, Esfandiari A. Postoperative Outcomes and recurrence rates in chronic subdural hematoma. *Br J Neurosurg* 2007; 21:272–5.
6. Nagatani K, Takeuchi S, Sakakibara F, Otani N, Nawashiro H. Radiological factors related to recurrence of chronic subdural hematoma. *Acta Neurochir (Wien)* 2011; 153:713.
7. Torihashi K, Sadamasa N, Yoshida K, Narumi O, Chin M, Yamagata S. Independent predictors for recurrence of chronic subdural hematoma: a review of 343 consecutive surgical cases. *Neurosurg* 2008; 63:1125–9.

 14.

8. Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural hematomas that influence their postoperative recurrence. *J Neurosurg* 2001; 95:256–62.
9. Santarius T, Kirkpatrick PJ, Ganesan D, Chia HL, Jalloh I, Smielewski P. Use of drains versus no drains after burr-hole evacuation of chronic subdural hematoma: a randomized controlled trial. *Lancet* 2009; 374:1067–73.
10. Algorta M, Spagnuolo E. Hematoma subdural crónico. Modalidades de tratamiento: revision del tema. Propuestas de manejo. *Rev Argent Neuroc* 2010; 24:195-205.
11. Mathiesen CS, Campbell E, Lindsay KW, Murray L. Treatment of chronic subdural hematomas—a retrospective comparison of minicraniectomy versus burr hole drainage. *Br J Neurosurg* 2010; 24:257–60.
12. Ramachandran R, Hegde T. Chronic subdural hematomas—causes of morbidity and mortality. *Surg Neurol* 2007; 67:367–72.
13. Santarius T, Lawton R, Kirkpatrick PJ, Hutchinson PJ. The management of primary chronic subdural haematoma: a questionnaire survey of practice in the United Kingdom and the Republic of Ireland. *Br J Neurosurg* 2008; 22:529–34.
14. Lega BC, Danish SF, Malhotra NR, Sonnad SS, Stein SC. Choosing the best operation for chronic subdural hematoma: a decision analysis. *J Neurosurg* 2010; 113:615–21.
15. Levi M, Eerenberg E, Kamphuisen PW. Bleeding risk and reversal strategies for old and new anticoagulants and antiplatelet agents. *J Thromb and Haemost* 2011; 9(9):1705–12.





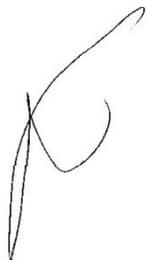


 15.

16. Tsai TH, Lieu AS, Hwang SL, Huang TY, Hwang YF. A comparative study of the patients with bilateral or unilateral chronic subdural hematoma: precipitating factors and postoperative outcomes. *J Trauma* 2010; 68: 571-5.
17. Forster MT, Mathe AK, Senft C, Scharrer I, Seifert V, et al. (The influence of preoperative anticoagulation on outcome and quality of life after surgical treatment of chronic subdural hematoma. *J Clin Neurosci* 2010; 17: 975-9.
18. MacFarlane MR, Weerakkody Y, Kathiravel Y. Chronic subdural hematomas are more common on the left than on the right. *J Clin Neurosci* 2009, 16:642-4.
19. Nakakawa Y, Ishizaki E, Inaba K. Bilateral chronic subdural hematoma cases showing rapid and progressive aggravation. *Surg Neurol* 2005; 64(5):444-9.







o b e h a d . c o m

ARABIC SUMMARY

الملخص العربي

النزيف المزمن تحت الام الجافية هو تراكم الدم في الفراغ تحت الام الجافية في مده تتراوح من ثلاثة أسابيع إلى عدة أشهر بعد الإصابة. و يتراوح معدل النزيف المزمن المرتجع تحت الام الجافية بعد الجراحه من ٢.٣% الي ٣٣%.

أفادت دراسات سابقة العديد من العوامل التي ترتبط مع معدل النزيف المزمن المرتجع تحت الام الجافية ، بما في ذلك السن، و زياده معدل النزف عند المريض، وكثافة النزيف و شكله الداخلي في الاشعه المقطعيه علي المخ و عرض النزيف و نزوح خط الوسط في الاشعه المقطعيه بعد العمليه و تجمع الهواء تحت الام الجافية بعد العمليه و وجود النزيف في كلتا الناحيتين من المخ و معدل ارتفاع الرأس بعد العمليه و درجه وعي المريض قبل و بعد العمليه.

هذه الدراسة هي دراسة استطلاعية على جميع المرضى (٤٠ مريضاً) الذين خضعوا لفض النزيف تحت الام الجافية في مستشفى جامعة الإسكندرية خلال سنه من الفتره ٢٠١٣/٩/١ الي ٢٠١٤/٨/٣١.

الاداة التشخيصية الرئيسية هي الاشعه المقطعيه علي المخ. تم تصنيف النزيف الي اربعة انواع والتي تتوافق مع المراحل الممكنة في التاريخ الطبيعي للتكوين و هي المتجانسه و الخطيه و المفصوله و التريبيقيه.

الاجراء الجراحي كان عمل حفرة في الجمجمه و فض النزيف بعد عمل فتحه في الام الجافية تحت التخدير الكلي او الموضعي (وفقاً للمخاطر القلبية للمريض و غيرها من الامراض المصاحبه) مع الري و وضع جهاز صرف مغلق تحت الجلد.

تم عمل اشعه مقطعيه علي المخ قبل و بعد العمليه و اخذ قياسات عرض النزيف و نزوح خط الوسط و ناحيه النزيف و شكل النزيف الداخلي و وجود او عدم وجود هواء تحت الام الجافية . كنا نعامل النزيف الثنائي كحالة واحدة، وحصل كلا الجانبين علي نفس طريقه العلاج.

وقد تم تعريف النزيف المزمن المرتجع تحت الام الجافية انه تكرر مثل حدوث الأعراض والعلامات التي تعزى إلى وجود نزيف مزمن علي نفس الناحيه في الاشعه المقطعيه علي المخ في خلال ثلاثة شهور من فض النزيف. و قد تحتم اجراء جراحه مره اخري اذا تكرر او لم يتحسن او نشأ عجز عصبي جديد.

عملت هذه الدراسة على ما يلي من العوامل التي قد تؤدي الي النزيف المزمن المرتجع تحت الام الجافية و التي تشمل العمر ، الجنس، قابليه و ميول المريض الي النزف، درجه الوعي قبل و بعد الجراحه، وضع الرأس بعد العمليه، شكل النزيف و عرضه، درجه نزوح خط وسط المخ، تجمع الهواء تحت الام الجافية و النزيف المزمن تحت الام الجافية علي كلتا الناحيتين من المخ.

و من هذه الدراسه تبين ان عرض النزيف المزمن تحت الام الجافية اكثر من ٢٠ ملليمتر قبل الجراحه و نزوح خط وسط المخ اكثر من ٥ ملليمتر و وجود النزيف علي كلتا الناحيتين تحت الام الجافية و وجود كميات كبيره من الهواء تحت الام الجافية في الاشعه المقطعيه بعد الجراحه و ميول المريض للنزف نتيجة الادويه المضاده للتخثر و الادويه المضاده لصفائح الدم كانت من العوامل المؤديه الي ارتجاع النزيف المزمن تحت الام الجافية.

وقد تبين ايضا ان معدل النزيف المرتجع كان اعلي في نوعي النزيف المنفصل و الصفحي في الاشعه المقطعيه علي المخ.

الملخص العربي

لجنة الإشراف

.....
أ.د./ علاء الدين محمد ابراهيم عيسى
أستاذ جراحة المخ و الأعصاب
كلية الطب
جامعة الإسكندرية

.....
د./ هشام عادل أبو العينين
أستاذ مساعد جراحة المخ و الأعصاب
كلية الطب
جامعة الإسكندرية

مشرف مشارك

.....
د./ وائل محمود خضر
مدرس جراحة المخ و الأعصاب
كلية الطب
جامعة الإسكندرية
وذلك لخبرته فى مجال البحث العلمي

تقييم العوامل المؤثرة علي النزيف المزمن المرتجع تحت الام الجافيه

مقدمة من

عبدالرحمن مجدي الحبشي رجب

بكالوريوس الطب والجراحة- الإسكندرية، ٢٠٠٩

للحصول على درجة

الماجستير

فى

الجراحة

موافقون

.....

.....

.....

لجنة المناقشة والحكم على الرسالة

أ.د/ خالد جلال الدين عارف
أستاذ جراحة المخ والأعصاب
كلية الطب
جامعة الإسكندرية

أ.د/ عصام الدين جابر صالح
أستاذ جراحة المخ والأعصاب
كلية الطب
جامعة المنوفية

د/ هشام عادل ابو العينين
أستاذ مساعد جراحة المخ والأعصاب
كلية الطب
جامعة الاسكندرية



تقييم العوامل المؤثرة علي النزيف المزمن المرتجع تحت الام الجافيه

رسالة علمية

مقدمة لكلية الطب - جامعة الإسكندرية
إيفاءً جزئياً لشروط للحصول على درجة

الماجستير

في

الجراحة

مقدمة من

عبد الرحمن مجدي الحبشي رجب

بكالوريوس الطب والجراحة - جامعة الإسكندرية، ٢٠٠٩
طبيب مقيم - مستشفيات جامعة الإسكندرية