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Comparative Study of Single Versus Double Burr Hole Drainage for Chronic Subdural Hematoma

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ABSTRACT

Introduction

Various surgical technique is used for evacuation of chronic subdural hematoma. Burr hole drainage is a most preferred. However, there exist a controversy regarding single versus double burr hole among neurosurgeon. This study aims to compare the single versus double burr hole drainage for chronic subdural hematoma in terms of mortality, wound infection and recurrence.

Methods

A retrospective observational study was performed over the period of 3 years. Data were collected in terms age, gender, type of surgery, mortality, wound infection and recurrence. These data were analysed to compare between the single versus double burr hole groups.

Results

A total of 53 patients with chronic subdural hematoma underwent burr hole drainage were enrolled. Mean age of patients was 61.87 ± 17.35 years with male to female ratio 4.88:1. In this study, single burr hole was performed in 35 patients (66%) versus double burr hole in 18 patients (34%).

Superficial surgical site infection was observed in 3 patients (5.7%) wherein 1 from single burr hole and 2 from double burr hole group with no statistically significant association (P value = 0.26). There was only 1 recurrence (1.9%). This was from single burr hole group versus no recurrence from double burr hole group which was not statistically significant (P value = 1.00). There was no mortality in both the groups in this study.

Conclusions

There is no effect on mortality, infection and recurrence comparing single versus double burr hole drainage following evacuation of chronic subdural hematoma.

Keywords: burr hole drainage; chronic subdural hematoma; recurrence.

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INTRODUCTION

Chronic subdural hematoma (cSDH) is one of the most common neurosurgical conditions treated by neurosurgeons.[1-5] Treatment options include both surgical as well as non-surgical treatment.[2,3,6] Surgical evacuation is performed by draining the cSDH via various neurosurgical techniques such as burr hole(s), craniotomy, twist drill evacuation and endoscopic assisted drainage.[1-5] Lately, burr hole(s) craniostomy is most preferred by neurosurgeons as the first tier treatment for cSDH.[1,3-5,7] The recurrence rates vary from 8-26%.[2,8]

The optimum number of burr holes (single versus double) that are needed to evacuate cSDH and to minimize the risk of recurrence remains debatable among neurosurgeons.[2,4,9] Most neurosurgeons favour single burr hole as it is speedy to perform and is cosmetically better. Nevertheless, others believe that it is not adequate, as it does not allow irrigation between the holes, and also it endangers a more recurrence rate in contrast to double burr hole.

To the best of our knowledge, there is no such comparative study done previously in our country. So, this study aims to compare the single versus double burr hole drainage for chronic cSDH in terms of mortality, wound infection and recurrence rate.

METHODS

A retrospective observational study was performed in the department of neurosurgery at Kathmandu Medical College Teaching Hospital (KMCTH), Sinamangal, Kathmandu between August 20, 2018 and August 31, 2021. This study was approved by institutional review committee (IRC) of KMCTH. All patients who are more than 18 years with chronic subdural hematoma and underwent either single or double burr hole drainage were included in this study. Those patients who are suffering from bleeding disorder and who has undergone ventriculoperitoneal shunt in the past were excluded from the study.

Burr hole drainage was performed under local anesthesia or local anesthesia with mild sedation as per tolerability of the patient. Incision was made at the posterior parietal region for single burr hole drainage and at the posterior frontal and posterior parietal region for double burr hole drainage. Incision was deepened to cut all the layers of scalp including pericranium. Pericranium was dissected off the skull surface with the help of periosteal elevator. Wound edges were kept apart by self-retaining retractor. Burr hole was made using high speed drill or Hudson brace according surgeon's preference. Dura was cut open in cruciate manner. Leaflets of the dura were everted and tied to the pericranium using silk to avoid bleeding from the dura. Luke warm normal saline irrigation was used for evacuation of subdural hematoma. Flushing of subdural space with normal saline continued till the color of the returning fluid is clear. Postoperative drain was not kept for both burr hole groups. Scalp wound was closed in two layers. Patient was instructed to nurse in head end flat position for 48 hours. Surgery was performed by three neurosurgeon who have more than 5 years of experience in neurosurgery. In case of bilateral hematoma, it was considered as a single case and managed with same treatment on both sides.

Wound infection was considered according to guideline laid by T C Horan in their study.[10] It was defined as following

- Purulent discharge from the incision site, with or without positive culture and sensitivity report
- Non purulent discharge from incision site with positive culture and sensitivity report
- Incision site deliberately opened by

surgeon in the presence of at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness or heat

- Diagnosis of infection by the surgeon

Category of wound infection:

- Superficial incisional surgical site infection: Infection occurring within 30 days after surgery involving only skin and/or subcutaneous tissue.
- Deep incisional surgical site infection: Infection occurring within 1 year after surgery involving fascial, muscle layers and also the mesh.

Recurrence was considered when patient had persistent of headache, focal neurological deficit, seizure and alter level of conscious. Repeat computed tomography scan (CT scan) head was done only in these patients if infection or recurrence is suspected. Contrast enhanced CT scan head was done in case of infection to look for intracranial extension.

Data were collected from the operation record register or admission record files and or discharge summary of the patients with regard to age, gender, side of cSDH, type of burr hole surgery, infection, recurrence and mortality. Follow up was performed during the OPD visit or from OPD record register and or by telephone contact whichever was feasible. Follow up was done at least 6 months from the time of surgery for each patient.

Data were entered into the excel sheet. Statistical analysis was performed using IBM SPSS Statistic version 25 (IBM Corporation, USA) for Macintosh. Continuous variables were expressed in term of mean and standard deviation. Categorical variables were expressed in term of frequency and percentage. Fisher exact test was used to compare the two surgical treatment groups in terms of infection, recurrence and mortality if any. P value < 0.05 were considered significant.

RESULTS

A total of 53 patients were enrolled into the study who underwent either a single burr hole or double burr hole drainage for cSDH. Age of the patients ranged from 18 to 90 years with mean age of 61.87 ± 17.35 Years. There were 44 male patients (83%) and 9 female (17%) patients. Male to female ratio 4.88:1 was noted. cSDH was seen on left side of the cranium in 27 patients (50.9%), right side of the cranium in 19 patients (35.8%) and bilateral location in 7 patients (13.2%). Out of these 7 patients with bilateral location of cSDH, 4 patients were from single burr hole drainage group whereas 3 patients were from double burr hole drainage group. In this study, single burr hole drainage of cSDH was performed in 35 patients (66%) and double burr hole drainage of cSDH in 18 patients (34%).

Superficial surgical site infection was observed in 3 patients (5.7%) wherein 1 patient was from single burr hole drainage group and 2 patients was from double burr hole drainage group. These infections were managed by medical treatment with intravenous antibiotics based on culture and sensitivity report and dressing of the wound. However, this difference in infection rate was not statistically significant (P value = 0.26). There was only 1 recurrence (1.9%). This recurrence was from single burr hole drainage group. There was no recurrence from double burr hole drainage group. This difference in recurrence rate was not statistically significant (P value = 1.00). There was no mortality was observed in both the burr hole drainage groups in this study.

DISCUSSION

The treatment of cSDH has significantly

developed over the course of time.[11-16] Out of these procedures, burr-hole drainage is the most preferred technique by majority of the neurosurgeon.[17,18] Still there is controversy regarding the optimum number of burr hole required to evacuate cSDH. As there is no study comparing single versus double burr hole in Nepal, this study aims to compare the single versus double burr hole drainage for chronic cSDH in terms of mortality, wound infection and recurrence rate.

The cSDH consist of vaso-active cytokines, inflammatory mediators, and fibrinolytic factors in high amount.[4] Saito K et al demonstrated that since persistence of these factors even after surgery give rise to an increase in recurrence of cSDH, thorough drainage of hematoma during operation is a mandatory surgical aim.[19] Various authors have used saline irrigation for thorough drainage of cSDH during surgery.[2-4,9] Saline irrigation was used in all the patients of both groups in this study.

In this study, mean age of the patients were 61.87 ± 17.35 years. Similar to this study Nayil et al reported mean age of 61.01 and 61.17 years for single burr hole and double burr hole group respectively.[20] male preponderance observed in this study (male: female = 4.88:1) was in concordance with other studies.[20,21]

Study by Rafi AN showed cSDH was found on the left side in 29 patients (41.42%), on the right side in 34 patients (48.57%) and it was bilateral in 7 patients (10%).[22] cSDH was seen on left side of the cranium in 27 patients (50.9%), right side of the cranium in 19 patients (35.8%) and bilateral location in 7 patients (13.2%) in this study. In this study, single burr hole drainage of cSDH was performed in 35 patients (66%) and double burr hole drainage of cSDH in 18 patients (34%). Similar to this study Kansal et al carried out single burr hole drainage in most of the patients that is in 195 patients (73%) versus double burr hole drainage in 72 patients (27%).[2]

Studies have shown that the most common surgical complications to occur following burr hole drainage are seizure, wound infection, subdural empyema and recurrent intracerebral hemorrhage. These complications rate may range between 3% to 28%.[23,24] Rafi AN in their study found surgical site infection in 8 patients (11.4%) with 5 patients in single burr hole versus 3 patients in double burr hole group. These infection rate between the two groups were not statistically significant (P value = 0.88).[22] This study also demonstrated identical results with surgical site infection in 3 patients (5.7%), one patient was from single burr hole and 2 patients were from double burr hole drainage group with no statistically significant difference.

Study by Taussky et al inferred that treatment of cSDH with one burr hole only is correlated with a significant higher postoperative recurrence rate as opposed to two burr hole craniostomy.[4] However, subsequent studies published did not reveal similar results, deducing that the number of burr holes for evacuation of cSDH was not statistically associated with postoperative recurrence rate. [2,3,9] Meta-analysis conducted by Belkhair S in 2013 also compared the recurrence rate of single versus double burr hole showed no significant difference in revision rate of two procedure.[25] Study by sale D at later part in recent past also supports no significant difference in recurrence rate comparing single and double burr hole drainage group.[26] This study also showed comparable results in terms of recurrence to these studies with no statistically significant association between single versus double burr hole drainage groups. Study by Rafi AN in the year 2018 where patients requiring a second operation for recurrence in 2 burr holes group was 1 case (2.85%) were statistically significantly less than (p value = 0.012) what was observed in the

1 burr hole group (6 cases, 17.14%).[22] However, Another updated meta-analysis performed by Wan Y et al in 2019 demonstrates that there were no significant differences in recurrence rate, complication rate and morbidity between single burr hole and double burr hole in the treatment of patients with cSDH.[27] Furthermore, mortality related with burr hole craniostomy was assessed in 5 studies where in 209 patients underwent single and 316 patients underwent double burr hole. Double burr hole was not related with an increased risk of mortality comparing with single burr hole in patients with cSDH (OR, 1.38; 95% CI, 0.55e3.46; P 1⁄4 0.58; I2 1⁄4 0%).[26] This study also showed no difference in mortality observed in both single burr hole and double burr hole drainage of cSDH.

CONCLUSIONS

Single burr hole drainage is as effective as double burr hole drainage for evacuation of cSDH in terms of mortality, infection and recurrence.

REFERENCES

1. Weigel R, Schmiedek p, Krauss JK. outcome of contemporary surgery for chronic subdural haematoma: evidence based review. J NeurolNeurosurg psychiatry. 2003 Jul;74(7):937-43. doi: 10.1136/jnnp.74.7.937. PMID: 12810784
2. Kansal R, Nadkarni T, Goel A. Single versus double burr hole drainage of chronic subdural hematomas. A study of 267 cases. J ClinNeurosci. 2010 Apr;17(4):428-9. doi: 10.1016/j.jocn.2009.07.109. PMID: 20202850.
3. lee JK, Choi JH, Kim CH, lee HK, Moon JG. Chronic subdural hematomas : a comparative study of three types of operative procedures. J Korean Neurosurg Soc. 2009 Sep;46(3):210-4. doi: 10.3340/jkns.2009.46.3.210. Epub 2009 Sep 30. PMID: 19844620; PMCID: PMC2764018.
4. Taussky p, Fandino J, landolt H. Number of burr holes as independent predictor of postoperative recurrence in chronic subdural haematoma. Br J Neurosurg. 2008 Apr;22(2):279-82. doi: 10.1080/02688690701818885. PMID: 18348026.
5. vignes JR. Surgical treatment of chronic subdural hematoma in the adult. Review of the literature. Neurochirurgie. 2001 Nov;47(5): 479-87. PMID: 11915761.
6. okada y, Akai T, okamoto K, Iida T, Takata H, Iizuka H. A comparative study of the treatment of chronic subdural hematoma-burr hole drainage versus burr hole irrigation. Surg Neurol. 2002 Jun;57(6):405-9. doi: 10.1016/s0090-3019(02)00720-6. PMID: 12176202.
7. lega BC, Danish SF, Malhotra NR, Sonnad SS, Stein SC. Choosing the best operation for chronic subdural hematoma: a decision analysis. J Neurosurg. 2010 Sep;113(3):615-21. doi: 10.3171/2009.9.JNS08825. PMID: 19877806.
8. Zakaraia AM, Adnan JS, Haspani MS, Naing NN, Abdullah JM: Outcome of 2 different types of operative techniques practiced for chronic subdural

hematoma in Malaysia: An analysis. Surg Neurol. 2008;69(6):608-15. doi: 10.1016/j.surneu.2007.01.054. PMID: 18486703.

9. Han HJ, park CW, Kim Ey, yoo CJ, Kim yB, Kim WK. one vs. two burr hole craniostomy in surgical treatment of chronic subdural hematoma. J Korean Neurosurg Soc. 2009 Aug;46(2): 87-92. doi: 10.3340/jkns.2009.46.2.87. Epub 2009 Aug 31. PMID: 19763208; PMCID: PMC2744031.
10. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. CDC definitions of nosocomial surgical site infections, 1992: a modification of CDC definitions of surgical wound infections. Infect Control Hosp Epidemiol. 1992 Oct;13(10):606-8. PMID: 1334988.
11. Drapkin AJ. Endoscopy for chronic SDH. Surg Neurol. 1997;48:427. doi: 10.1016/s0090-3019(97)00211-5. PMID: 9315147.
12. Horn EM, Feiz-Erfan, Bristol RE, Spetzler RF, Harrington TR. Bedside twist drill craniostomy for chronic subdural hematoma: A comparative study. Surg Neurol. 2006;65:150-4. doi: 10.1016/j.surneu.2005.05.030. PMID: 16427409.
13. Lee JY, Ebel H, Ernestus RI, Klug N. Various surgical treatments of chronic subdural hematoma and outcome in 172 patients: Is membranectomy necessary? Surg Neurol. 2004;61:523-28. doi: 10.1016/j.surneu.2003.10.026. PMID: 15165784.
14. Mohamed EE. Chronic subdural haematoma treated by craniotomy durectomy outer membranectomy and subgaleal suction drainage. Personal experience in 39 patients. Br J Neurosurg. 2003;17:244-7. doi: 10.1080/0268869031000153134. PMID: 14565521.
15. Weisse A, Berney J. Chronic subdural haematomas: Results of a closed drainage method in adults. Acta Neurochir (Wien). 1994;127:37-40. doi: 10.1007/BF01808544. PMID: 7942179.
16. Zumofen D, Regli L, Levivier M, Krayenbühl N. chronic subdural hematomas treated by burr hole trepanation and a subperiostal drainage system. Neurosurgery. 2009;64:1116-22. doi: 10.1227/01.NEU.0000345633.45961.BB. PMID: 19487891.
17. Gazzeri R, Galaraza M, Neroni M, Canova A, Refice GM, Esposito S. Continuous subgaleal suction drainage for the treatment of chronic subdural haematoma. Acta Neurochir (Wien). 2007;149:487-93. doi: 10.1007/s00701-007-1139-8. Epub 2007 Mar 28. PMID: 17387427.
18. Khursheed N, Ramzan A, Sajad A, Zahoor S, Wani A, Nizami F, et al. Subdural hematomas: An analysis of 1181 Kashmiri patients and review of literature. World Neurosurg. 2012;77(1):103-10. doi: 10.1016/j.wneu.2011.06.012. PMID: 22405391.
19. Saito K, Ito H, Hasegawa T, Yamamoto S. Plasmin-α2-plasmin inhibitor complex and α2-plasmin inhibitor in chronic subdural hematoma. Journal of neurosurgery. 1989 Jan 1;70(1):68-72. https://doi.org/10.3171/jns.1989.70.1.0068
20. Nayil K, Altaf R, Shoaib Y, Wani A, Laharwal M, Zahoor A. Chronic

subdural hematomas: single or double burr hole-results of a randomized study. Turk Neurosurg. 2014;24(2):246-8. doi: 10.5137/1019-5149.JTN.8465-13.0. PMID: 24831368.

21. Pahatouridis D, Alexiou GA, Fotakopoulos G, Mihos E, Zigouris A, Drosos D, et al. Chronic subdural haematomas: a comparative study of an enlarged single burr hole versus double burr hole drainage. Neurosurg Rev. 2013 Jan;36(1):151-4; discussion 154-5. doi: 10.1007/s10143-012-0412-3. Epub 2012 Aug 7. PMID: 22869256.
22. Rafi AN, Dalvandi M, Bayat M, Kamali A. Comparing clinical responses to using one burr hole and two burr holes to treat chronic subdural hematoma. Eurasian Journal of Analytical Chemistry. 2018 Jan 1;13(3):em19.
23. Harders A, Eggert HR, Weigel K. Treatment of chronic subdural haematoma by closed external drainage. Neurochirurgia. 1982 Sep 1;25(5):147-52. PMID: 7155252
24. Rohde V, Graf G, Hassler W. Complications of burr-hole craniostomy and closed-system drainage for chronic subdural hematomas: a retrospective analysis of 376 patients. Neurosurgical review. 2002 Mar;25(1):89-94. https://doi.org/10.1007/s101430100182
25. Belkhair S, Pickett G. One versus double burr holes for treating chronic subdural hematoma meta-analysis. Can J Neurol Sci. 2013 Jan;40(1):56-60. doi: 10.1017/s0317167100012956. PMID: 23250128.
26. Sale D. Single versus Double Burr Hole for Drainage of Chronic Subdural Hematoma: Randomized Controlled Study. World Neurosurg. 2021 Feb;146:e565-e567. doi: 10.1016/j.wneu.2020.10.140. Epub 2020 Oct 28. PMID: 33130139.
27. Wan Y, Xie D, Xue Z, Xie J, Song Z, Wang Y, Yang S. Single Versus Double Burr Hole Craniostomy in Surgical Treatment of Chronic Subdural Hematoma: A Meta-Analysis. World Neurosurg. 2019 Nov;131:149-54. doi: 10.1016/j.wneu.2019.07.097. Epub 2019 Jul 16. PMID: 31323397.

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