



Original article

ACTA FAC MED NAISS 2009; 26 (2): 89-92

Misa Radisavljevic
Aleksandar Igic

Clinic of Neurosurgery,
Clinical Center Nis

PREOPERATIVE CT FINDINGS IN EVALUATION OF THE RISK OF RELAPSE OF CHRONIC SUBDURAL HEMATOMAS

SUMMARY

Preoperative CT examination of the brain is a necessary diagnostic procedure aiming to establish the diagnosis of chronic subdural hematoma (HSH). The aim of this study was to evaluate the significance of preoperative CT findings in evaluation of the risk of relapse of chronic subdural hematomas. The retrospective analysis of 93 patients who were operatively treated at the Clinic of Neurosurgery in Nis from 2006-2008 was performed.

A high level of relapse was shown by the HSHs which at the preoperative CT displayed the characteristics of hyperdensity (11,76%) and mixed-density (28,58%). These results suggest that preoperative CT findings can be considered useful in the evaluation of the risk of HSH relapse. In addition, the preoperative CT findings can help the neurosurgeon in the selection of the operative technique.

Key words: chronic subdural hematoma (HSH), computed tomography (CT), relapse

INTRODUCTION

Chronic subdural hematomas (HSHs) represent a frequent type of intracranial bleeding, most often caused by the interruption of continuity of bridging veins during mild head trauma. Clinical presentation is a different level of unconsciousness which can vary from confused condition to comma, headaches, vomiting, weakness, aphasia, hemiparesis, epileptic attacks(1).

Computed tomography (CT) of the brain is a necessary diagnostic tool with the aim of making a correct diagnosis.

HSH is presented at CT as intracranial expansive mass with different density and medio-sagittal shift of the brain parenchyma.

The simplest operative procedure is trephin craniectomy with irrigation and drainage (2).

High percent of relapse reported in the literature varies from 3-30 % (3,4). The aim of this

study was to show the significance of preoperative CT findings, with the goal of evaluating the risk of HSH relapses.

MATERIALS AND METHODS

Medical and radiological documentation of 93 patients who were operated at the Clinic of Neurosurgery in Nis from 2006 to 2008 was analyzed.

HSH relapse represents reaccumulation of blood in the postoperative hematoma cavity, confirmed by control CT findings. Our study investigated the correlation between HSH relapse and sex, age, data about head injury, radiological parameters – density of hematomas on CT and mediosagittal shift of brain structures. Density of hematomas is classified into four categories in relation to relative density of brain parenchyma: A) hematomas of low density (hypodense hematomas) (Figure 1);

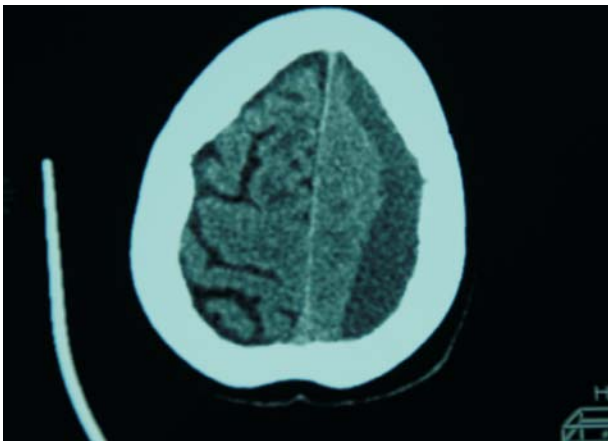


Figure 1: Hypodense chronic subdural hematoma

B) hematomas with density of the brain (isodense hematomas); C) hematomas of high density (hyperdense hematomas) (Figure 2);

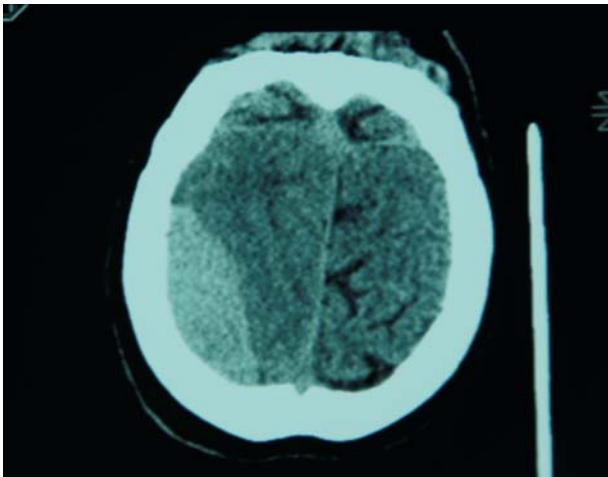


Figure 2: Hyperdense chronic subdural hematoma

D) hematomas of mixed-density (Figure 3).

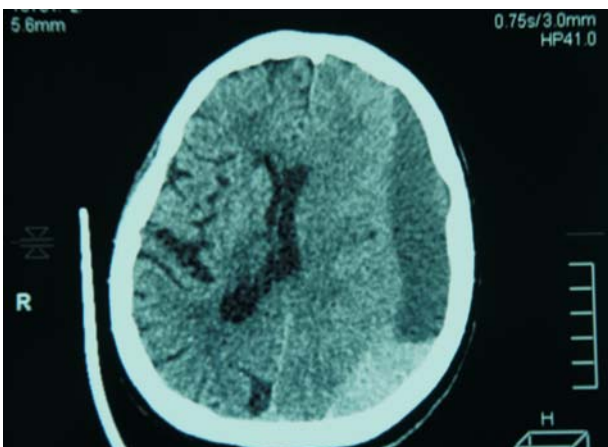


Figure 3: Mixed-dense chronic subdural hematoma

Patients were divided into two groups. The group with a relapse (RG) and the group without

relapse (NRG).

All the patients were operated under general anesthesia using the burr hole drainage technique, which involves placing the burr hole point at the place of the greatest haematoma thickness. After opening the dura, hematoma capsule opens by diathermic coagulation, and through this opening the silicon catheter is introduced through which the irrigation by sterile physiological solution until complete emptying of hematoma content is performed (Figure 4).



Figure 4: Intraoperative presentation of chronic subdural hematoma

Then, the cavity of the hematoma is filled with physiological solution, and drainage catheter is left in the hematoma cavity for the 48 hours. During this time the patient is lying in bed under rehydration therapy.

RESULTS

During a three-year period at the Clinic of Neurosurgery in Nis 93 patients were operated, out of which 47 men and 46 women (Table 1).

Table 1. Gender and age distribution

	Men	Women	age ≤ 65	age ≥ 65
A	14	13	16	9
B	16	16	11	21
C	9	8	7	10
D	9	8	6	11

HSH relapse occurred in 6 patients, 3 women and 3 men. Reoperation was necessary in all patients in the group with relapse, while the third operation was necessary in one patient.

The mean age of the patients with relapse was 59.2 years, and it was not significantly different from the age of the patients in the group without relapse (61.4 years). Data about initial head injury

could be obtained with certainty from 58 patients and varied from 20 to 42 days, 31 days on average, and it did not show statistical significant difference among the analyzed groups. Incidence of HSH relapse in the group of hyperdensity (C group) was 11.76% (two patients) and in the group with mixed density (group D) was 28.58% (four patients), which represented a statistically significant difference (Table 2).

Table 2. Distribution of HSH based on CT density

	number of HSH	number of relapse	percentage of relapse
A-hypodense	27	0	0
B-isodense	32	0	0
C-hyperdense	17	2	11.76
D-mixedensity	17	4	28.58

The level of mediosagittal shift in the group with relapse (RG) was 10.5 ± 5 mm, while in the group without of relapse (NGR) it was 8.5 ± 5 mm.

DISCUSSION

In our study, data about mild head trauma was obtained from 62.36% of patients, which corresponds to the data from literature (5).

Aung et al. have observed that the volume of the subdural space increases after the seventh decade by 11%, which explains more frequent occurrences of HSH in the older population, but also differences in clinical manifestation of HSH. Older patients as most often symptoms have disorders of memory, confusion and disorientation, while younger patients, as initial symptoms, report those associated with increased intracranial pressure, such as headache, vomiting and papilledema (6,7).

After mild head injury there is an interruption of bridging veins, which leads to initial bleeding in subdural space. Outer neomembrane of hematomas is formed within the first week after the trauma, while the inner membrane is formed in the third week of hematoma development. Outer membrane is a place of new blood vessels' formation and their frequency is in a direct proportion with membrane thickness (8,9). Processes of fibrinolysis in the outer membrane are considered responsible for increase of hematomas as well as repeated bleeding (10).

Newly formed blood vessels of the outer membrane are fragile during the first four weeks of hematoma development, which leads to more frequent repeated bleeding into hematoma cavity. The presence of blood in hematoma cavity increases the density of CT display, so that HSH are presented as hyperdense (C group) or hematomas of mixed-density (D group). After carrying out a routine operative procedure, a burr hole drainage with irrigation of a greater part of outer membrane remains so the HSH relapse can occur in higher percentage. In our study, the percentage was 11.76% in the group of hyperdensity (C group) and 28.58 in the group of haematomas of mixed-density (D group).

CONCLUSION

CT examination represents a routine diagnostic procedure. The significance of CT examination is not just in making the correct diagnosis of HSH, but it can also, in significant percentage, point to possibilities of HSH relapse.

Preoperative CT examination can help a neurosurgeon to choose a more extensive operative technique (capsulectomy) in order to decrease an additional percentage of relapses.

REFERENCES

- Samudrala S, Cooper PR: Traumatic intracranial hematomas in Wilkins RH. Rengachary SS : Neurosurgery, ed 2. New York: McGraw-Hill. 1996; 3: 2799-2801.
- Ernatus RI, Beldzinski P, Lanfermann H, Klug N. Chronic subdural hematoma: surgical treatment and outcome in 104 patients. *Surgical Neurology* 1997; 48: 220-225.
- Choi CH, Moon BG, Kang HI, Lee SJ, Kim JS. Factors affecting the reaccumulation of chronic subdural hematoma after burr-hole trephination and closed-system drainage. *J Korean Neurosurg Soc* 2004; 35: 192-198.
- Markwalder TM. Chronic subdural hematomas: A review. *J Neurosurg* 1981; 54: 637-645.
- Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural hematomas that influence their postoperative recurrence. *Jurnal of Neurosurgery* 2000; 95: 791-795.
- Aung TH, Wong WK, Mo HP, Tsang CS. Menagment of chronic subdural hematoma: burr hole drainage replacement with Hartmann's solution and closec-system drainage. *Hong Kong Medical Jurnal* 1999; 5: 383-386.
- Soh JN, Oh SM, Shin DI, Kim SM, Cho YJ, Kim CH et al. Overview of seizure occurrence in the patients with chronic subdural hematoma. *J. Korean Neurosurg Soc* 1997; 26: 704-708.
- Killeffer JA, Killeffer FA, Schochet SS. The outer neomembrane of chronic subdural hematoma. *Neurosurg Clin N Am* 2000; 11: 407-412.
- Yamashima T. The inner membrane of shronic subdural hematomas: Pathology and pathophysiology. *Neurosurg Clin NAm* 2000; 11: 413-424.
- Ito H, Yamamoto S, Saito K, Ikeda K, Hiseda K. Quantitative estimation of hemorrhage in chronic subdural hematoma using the Cr erythrocyte labeling method. *J Neurosurg* 1987; 66: 862-864.

PREOPERATIVNI CT NALAZ U PROCENI RIZIKA RECIDIVA HRONIČNIH SUBDURALNIH HEMATOMA

Miša Radisavljević, Aleksandar Igić

Klinika za neurohirurgiju, Klinički centar Niš

SAŽETAK

Preoperativni pregled endokranijuma kompjuterizovanom tomografijom je neophodan dijagnostički postupak u cilju postavljanja dijagnoze hroničnog subduralnog hematoma. Cilj ovog rada bio je da proceni značaj preoperativne kompjuterizovane tomografije u proceni rizika recidiva HSH. Načinjena je retrospektivna analiza 93 bolesnika koji su operativno lečeni na Klinici za neurohirurgiju u Nišu u periodu 2006-2008.

Visoku stopu recidiva pokazali su HSH koji su na preoperativnom CT prikazu pokazali karakteristike hiperdenznih (11,76%) i mikso-denznih (28,58%). Ovi rezultati sugerišu da se preoperativni CT može smatrati korisnim u proceni rizika recidiva HSH, kao i da preoperativni CT nalaz može pomoći operatoru u izboru operativne tehnike.

Ključne reči: hronični subduralni hematom, recidiv, kompjuterizovana tomografija