INTRODUCTION:
Chronic subdural hematoma (SDH) has been defined as subdural collection of blood of more than three weeks duration. Surgical intervention for chronic subdural hematoma is one of the most rewarding surgeries in neurosurgical practice. This disease mostly affects the elderly population and as population in general is increasing due to increase in life expectancy; more and more cases are being diagnosed and treated. Various surgical methods have been discussed in the past and practice parameters and beliefs vary between different institutions. There is still a lack of consensus regarding optimal management and no definite guidelines have been laid down. Various procedures used include twist drill and aspiration, burr-hole craniostomy with or without subdural drain, single versus two burr holes craniostomy and craniotomy. This study focuses on the outcome of two burr holes craniostomy with or without subdural drain placement with respect to radiological and symptomatic recurrence.

MATERIAL AND METHODS:
This is a retrospective study conducted from June 2012 to June 2017 at the department of Neurosurgery, Pt. JLN Medical College and Hospital, Raipur. Total 298 patients were admitted with chronic subdural hematoma in the department of Neurosurgery, Pt. JLNM Medical College Raipur. Bilateral chronic SDH was present in 33 (18.03%) cases. Presentation was only headache in 102/183 (55.73%), headache with decreased consciousness level in 29/183 (15.84%) and headache with contralateral deficit in 55 (29.70%). Total numbers of symptomatic recurrences in the study cohort were 21.73% of radiological recurrences (28.70%). Total number of hemispheres drained was 216. Subdural drain was placed in 94/216 (43.51%) hemispheres. No drain was placed in 122/216 (56.48%) hemispheres. In drain group, there were 23 (24.46%) radiological recurrence of which only 5 (5.31% of drain group) were symptomatic. In no drain group, there were 39 (31.96%) radiological recurrences and 11 (9.01% of no drain group) symptomatic recurrences. The difference was not statistically significant.

RESULTS:
Cohort was divided into two groups, drain versus no drain. Radiological and symptomatic recurrences were noted in both drain and no drain group. Out of total 298 patients, 29 underwent craniotomy, 34 had significant contralateral deficit in 36/183 (19.67%), headache with decreased consciousness level in 29/183 (15.84%) and headache with contralateral deficit with decreased conscious level in 16/183 (8.74%) cases. Bilateral chronic SDH was present in 33 (18.03%) cases. Total number of hemispheres drained was 216. Subdural drain was used in 94/216 (43.51%) hemispheres. No drain was placed in 122/216 (56.48%) hemispheres. The decision of drain placement was surgeon's choice. The cohort was divided into two groups – drain group or no drain group. In drain group, there were 23 (24.46%) radiological recurrence of which only 5 (5.31% of drain group) were symptomatic. Symptomatic recurrences were 21.73% of radiological recurrences requiring interventions. In no drain group, there were 39 (31.96%) radiological recurrences and 11 (9.01% of no drain group) symptomatic recurrences. Symptomatic recurrences were 28.20% of radiological recurrences requiring interventions. Total numbers of radiological recurrences in the study population were 62/216 (28.70%). Total numbers of symptomatic recurrences in the study
population were 16/216 (7.40%). Out of total recurrences only 16/62 (25.80%) became symptomatic. Statistical analysis did not reveal any significant difference in radiological and symptomatic recurrences between the groups. The results has been summarised in Table.

<table>
<thead>
<tr>
<th>Total Number of cases</th>
<th>183</th>
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<tr>
<td>Bilateral Chronic SDH</td>
<td>33</td>
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<tr>
<td>Total number of hemispheres drained</td>
<td>216</td>
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<tr>
<td>Mean Age</td>
<td>51.03 years (range 22-83 years)</td>
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<tr>
<td>Male: Female ratio</td>
<td>151:32, 4.71:1</td>
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</table>

**DISCUSSION:**
Although trephination of skull dates back to the Neolithic period, it was Wepfer who first gave pathological description of chronic SDH, as two cases of “serum accumulation between duramater and piamater” in 1675. The term pacchymenigitis hemorrhagica interna was introduced by Virchow for chronic subdural hemorrhagic collections and following failure of surgical trials via auditory meatus, it was assumed to be an incurable disorder. This led to a number of unfortunate patients leading their life in mental asylums. Cushing in early twentieth century demonstrated the utility of neurosurgical procedures for chronic SDH but his work was limited by the lack of imaging modalities. More patients were being diagnosed after Dandy’s work on pneumoencephalography. Cure rates and intervention rates improved after advent of CT scan. In the current era with better and easily availability of imaging facilities, increase in life expectancy and refinement and advancement of neurosurgical techniques, number of cases diagnosed and their outcomes have improved, considerably.

Definitive data regarding the incidence of chronic subdural hematoma, in the pre-CT era is lacking. In autopsy series published by Osler there were 197 cases of chronic subdural hematoma among 1185 cases. In early CT scan era the incidence reported was 1-2 cases/10000 population per year. Newer studies have reported the incidence to be as high as 13.1 case/100,000. Patients older than 40 years of age form almost 80 percent of cases and the peak incidence occurs in the 6th decade. In our series mean age of presentation was 51.03 years (range 22-83 years). There is a clear male gender predilection among the cases. Male: Female ratio 4.71:1. Other contributing factors being atrophic brain either due to aging or chronic alcoholism, degenerative brain disease, intracranial circulation to the underlying brain. With current understanding it appears that hematoma expansion occurs because of local angiogenesis and inflammation leading to repeated haemorrhage due to delayed absorption. Long standing inflammation leads to formation of granulation tissue as outer membrane adhered to dura and an inner membrane close to piamater. The pressure effect by hematoma reduces the cerebral blood circulation to the underlying brain.

Presentation of chronic SDH varies from asymptomatic to comatose condition. Chronic SDH is asymptomatic in large number of cases. On examination they have mild cognitive impairment. Nearly two third of the patients remember history of trauma. Most patient presents with nonspecific refractory headache. The characteristic history of raised ICP type and headache increasing on head movement is found in rarely. The symptom development is slow and with recurrent bleeds they become steadily symptomatic. Some patients present with contralateral deficits in form of contra-lateral weakness, speech difficulties and decreased mentation. In our series only headache was seen in 55.73%, headache with contralateral deficit in 19.67%, headache with decreased consciousness level in 15.84% and headache with contralateral deficit with decreased conscious level in 8.74% of cases.

Of all the controversies related to chronic subdural hematoma, radiological evaluation is an exception. They are readily diagnosed on non contrast CT scan. In cases of sub-acute subdural haematoma, subtle findings of isodense bilateral collections with effacement of sulci are seen. MRI can further delineate the diagnosis. Chronic SDH appears as crescent shaped concavo-convex collection between brain parenchyma and calvaria. When under pressure underlying sulci efface and contralateral ventricular shift becomes evident. It is not uncommon to see midline shift of more than 1 cm without much symptoms unlike in acute subdural hematoma. This happens because of the chronicity of process, allowing brain to shift and compensate for the extra intracranial volume. The occurrence of symptoms mainly depends upon individual’s cerebral compliance. This is the main reason why young patients become symptomatic with thin collection in comparison to elderly with age related atrophic brain. The appearance of blood on CT scan depends upon age of blood and recurrence of haemorrhage. In early cases blood appears hypodense. With time it looses its hyperdensity on CT scan. Mixed density hematomas are due to recurrent bleeds. There may be recent bleed in hematoma and patients present like acute SDH. Various classifications have been mentioned in the literature. Based on CT scan chronic SDH has been classified into four types by Naganuma et al.2 They may homogenous, laminar type, layered or separated type and trabecular type. On T1W if the haematoma is stable it appears isoointense to CSF, it can appear hyperintense to CSF if there is rebleed. On T2W if haematoma is stable it appears isointense to CSF if there is rebleed the haematoma appears hypointense; on FLAIR it appears hyperintense to CSF. MRI also helps in delineation of membranes.

The treatment strategy of chronic SDH has had a paradigm shift from ‘wait and watch’ to ‘watch and scan’ to ‘scan and treat’. There have been few reports of spontaneous resolution to suggest wait and watch policy. For asymptomatic thin chronic SDH, watch and scan policy may be justified. The current practice is ‘scan and treat’ the symptomatic patients. Both pharmacological and surgical methods have been described. Till now no definitive class I evidences have been published in favour of medical treatment. Medical treatment has primarily been advocated in asymptomatic patients. Corticosteroids (both dexamethasone and prednisolone) had been advised for conservative management, idea being anti-inflammatory and antiangiogenic properties of the drugs. This use of steroid has been supported in only observational studies but there is no trial to support or refuse their use. Recently in June 2016 SUCRE trial (RCT) was started to study the role of steroids in chronic subdural hematoma. Some isolated reports have advocated the long term use of mannitol, but has not been supported by others. Some clinicians have used the anti-angiogenic property of angiostatin converting enzyme inhibitor with favourable results.

Till date surgical intervention is considered the gold standard for chronic SDH. Surgical evacuation permits the reduction in intracranial pressure and increases the flow to underlying compromised brain parenchyma. Surgical options vary from twist drill craniostomy and aspiration, burr holes craniostomy to craniotomy. Twist drill craniostomy and aspiration is a simple bed side procedure under local...
Incidence of recurrence varies from 5-30% in various series. In our series total radiological recurrences were 28.70% out of which only 25.80% became symptomatic. Various factors have been studied in literature to reduce the recurrence rates after surgical evacuation. Burr hole craniostomy and craniotomy, double burr holes, use of subdural drains, intra-operative saline irrigation, frontal position of catheter, supine position for first three days, hyperhydration, use of steroids, keeping the drainage catheter for longer duration, subgaleal placement of drain, unilateral collection, midline shift < 5 mm, thickness of hematoma <1 cm, non-frontal basal type, no history of alcoholism, presence of diabetes, less brain atrophy, presence of pneumocephalus in postoperative imaging, homogenous type on CT scan and younger age, have been found to be associated with lower recurrence rates. Separated type of chronic SDH is associated with higher recurrence rate. Out of these factors only placement of subdural drain has class I evidence in literature.

Ivamoto et al. in 2016 has published comprehensive systemic review regarding surgical practice parameters. He had made following observations, on the basis of the meta-analysis – (1) that use of drains are associated with lower recurrence rates (2) there is no significant difference in outcome between twist drill craniostomy with or without drainage, versus, one or two burr hole craniostomy, with or without drainage (3) there is no significant difference in outcome related to post-op patient head position although patient with elevated head position had lower hospital stay (4) Position of catheter tip does not change outcome, although frontal position of catheter is favoured (5) use of thrombin solution for intra operative irrigation is associated with lower recurrence rates (6) lesser duration of drainage (48 hours) is associated with less general complications without change in other outcomes (7) Use of mannitol is not justified (8) ACE inhibitors have not been found to be useful in reducing recurrences.

CONCLUSIONS:
It is clear from this discussion that most of the current management strategies are individual and institutional. Based factors have been described associated with recurrences. The only practice which has class I evidence is placement of subdural drains. Radiological recurrence may be seen in many but does not always require re-look surgery. Other parameters in management of chronic subdural hematoma have unsolved controversies. More randomised controlled trials are required for proper formulation of universally accepted guideline which can help clinicians to decide between treatment modalities.

REFERENCES:
21. Wang, Qing-Feng MD; Cheng, Cheng MD; You, Chao MD, PhD A New Modified Twist Drill Craniostomy Using a Novel Device to Evacuate Chronic Subdural Hematoma. Medicine. 2016;95(10): 5016.
35. Sindou M, Ibrahim I, Maarrawi J. Chronic sub-dural hematomas: Twist drill craniostomy with a closed system of drainage, for 48 hours only, is a valuable surgical treatment. Acta Neurochir (Wien) 2010;152:545-6.
47. Shakkal AAS, Gamel EEE, Farid AM. Chronic subdural hematoma: complication avoidance. Tanta medical journal 2014;42(1):6-13