SDH with Bleeding Diathesis—a Management Protocol

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Abstract Chronic subdural hematoma (SDH) is one of the leading causes of morbidity and mortality in elderly. Patients taking antiplatelets and/or anticoagulants have increased risk of bleeding during the perioperative period. Precise dose blood products and specific surgical technique have been effective in preventing hemorrhagic complications perioperatively. From Jan 2010 to Dec 2012, 25 patients who were on antiplatelets and/or oral anticoagulants underwent emergency surgery for chronic or acute on chronic SDH. Patients were divided into three groups: group I—patients on antiplatelets, group II—patients on oral anticoagulants, and group III—patients taking both. Of these, 21 patients underwent minicraniotomy with microsurgical membranectomy and 4 patients underwent burr hole craniostomy. Random donor platelet concentrate (RDPC) and fresh frozen plasma (FFP) were used depending on whether patient was on antiplatelets or oral anticoagulants. Results were evaluated on

the basis of ease of intraoperative hemostasis, incidence of rebleeding in postoperative period, postoperative imaging, and reversal of neurological deficits. Group I, group II, and group III had 16, 4, and 5 patients, respectively. Group I received a mean of 7 units of RDPC. Group II received a mean of 4 units of FFP. Group III received a mean of 7 units of RDPC and 4 units FFPs. There was no problem with intraoperative hemostasis and no incidence of rebleeding. We suggest specific dose protocol for reversal of antiplatelet and anticoagulant effect and specific surgical procedure in preventing intraoperative bleeding and postoperative rebleeding in the above group of patients.

Keywords SDH · Antiplatelets · Anticoagulants · Emergency · Protocol · Minicraniotomy

Introduction

The use of antiplatelet and oral anticoagulant drugs in patients who are at a high risk of having a thromboembolic event is increasing [1]. These patients have an increased risk of bleeding due to antiplatelet and anticoagulant effects [1–4]. The risk of intracranial bleed as compared to general population is twofold [2, 4]. Moreover, these patients cannot be transfused a large amount of blood products due to poor cardiac reserve due to premorbid conditions like hypertension, coronary artery disease, ischemic heart disease, diabetes mellitus, atrial fibrillation, cerebral venous thrombosis, deep vein thrombosis, rheumatic heart disease, unstable angina, and poststenting or valve replacement surgery for which the patients were on antiplatelet and anticoagulant drugs. These patients have an increased tendency of rebleed after any surgical procedure more so in a cranial surgery [1, 2].

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Subdural hematoma is one of the intracranial presentations in patients taking antiplatelet and anticoagulant drugs. Moreover, there is paucity of literature about the protocol of reversal of antiplatelet and anticoagulant effects in an emergency situation in such patients, and also, the ideal surgical technique which would prevent rebleed is not well defined. Here, in our study, we have made an attempt to define a protocol for reversing the effect of antiplatelet and anticoagulant drugs in an emergency situation and to optimize the surgical procedure to prevent rebleed in patients with chronic/subacute/acute on chronic subdural hematoma (SDH) undergoing emergency surgery.

Material and Methods

Between Jan 2010 and Dec 2012, 140 patients of chronic, subacute, or acute on chronic SDH were operated in the neurosurgery department of St. John's Institute of Health Sciences, Bangalore. Out of these, 45 patients were on antiplatelet and/or oral anticoagulant drugs. Of these, 25 patients required emergency surgery due to impending herniation.

These 25 patients were divided into the following:

Group I—taking only antiplatelet drugs (aspirin and/or clopidogrel 75–150 mg daily for an average duration of 28 months)

Group II—taking only oral anticoagulants (warfarin, on an average dose of 2.8 mg for an average duration of 15 months)

Group III—taking both antiplatelets and oral anticoagulants

Indications

Diseases	Antiplatelets	Anticoagulants
Ischemic heart disease	6	
Cerebrovascular accidents	1	
Rheumatic heart disease	1	
Hypertension	18	
S/P coronary stenting	4	
Peripheral vascular disease	2	
Atrial fibrillation		3
Deep vein thrombosis		2
Cerebral venous thrombosis		1
Portal vein thrombosis		2
Valve replacement		1

Selection Criteria

1. Patients with subacute/chronic/acute on chronic SDH based on CT brain findings of isodensity for subacute,

hypodensity for chronic, and mixed density for acute on chronic SDH

The etiology for the SDH formation was most probably due to antiplatelet and/or anticoagulant drugs which the patients were receiving.

2. Patients on single or dual antiplatelet and/or oral anticoagulant drug
3. Patients requiring emergency surgery in view of the following:
 - (a) Low Glasgow Coma Scale (GCS)
 - (b) Progressive neurological deficit
 - (c) CT/MRI evidence of transtentorial herniation

The patients had an international normalized ratio (INR) in the range of 0.8 to 4. The antiplatelets and the anticoagulants were stopped just prior to the surgery.

The agents used for reversing the effect of antiplatelet and oral anticoagulant drugs were as follows:

- Random donor platelet concentrate (RDPC)
- Fresh frozen plasma (FFP)
- Vitamin K

The protocol used was as follows:

1. RDPC—1 unit/10 kg body weight was given perioperatively to all patients taking antiplatelet drugs irrespective of the type and number of antiplatelet drug received by the patient (according to the recommended dose) [5].
2. FFP—12 ml/kg body weight was given perioperatively to all patients taking oral anticoagulant drugs irrespective of INR levels (based on the standard dose protocol) [6–8].
3. Vitamin K was given 10 mg IV stat to patients on oral anticoagulant with high INR [9].

The coagulogram was not repeated prior to surgery in view of emergency. All patients were operated under local anesthesia or laryngeal mask anesthesia. The suggested surgical procedure is trephine or minicraniotomy with microsurgical membranectomy. The results were evaluated on the basis of ease of intraoperative hemostasis, neurological recovery, and the presence/absence of rebleed in postoperative CT. Coagulogram was repeated postoperatively.

Results

There were 10 female and 15 male patients in the study with a mean age of 57 years (range 29–80 years) and 63 years (range 32–90 years), respectively. There was no statistical significance in age difference between males and females. There

were 16 patients (64 %) in group I, of which 11 patients were on single antiplatelet drug and 5 on dual antiplatelet drug; 4 patients (16 %) in group II; and 5 patients (20 %) in group III. The mean age of group I was 66 years, group II was 44 years, and group III was 55 years. The mean age difference between groups I and II was 22 years which was statistically significant ($p=0.006$).

Patients in group I received a mean of 7 units (4–10 units) of RDPC perioperatively according to our formula.

Patients in group II received a mean of 4 units (2–6 units) (1 unit=200 ml) of FFPs perioperatively along with vitamin K.

Patients in group III received a mean of 7 units (4–10 units) of RDPC and 4 units (2–6 units) of FFPs perioperatively along with vitamin K.

All patients had SDH of thickness of more than 2 cm with septations and midline shift of more than 1 cm on CT brain. Twenty one patients (84 %) underwent minicraniotomy with microsurgical membranectomy. Four patients (16 %) had burr hole procedure due to severely comorbid conditions.

The first patient was postmitral valve replacement.

The second patient had severe bronchial asthma

The third patient had left ventricular dysfunction with atrial fibrillation

The fourth patient had ventricular tachycardia with recent ischemic heart disease

One patient with bilateral SDH had minicraniotomy done on the larger SDH side and burr hole on the opposite side. Nine patients (36 %) underwent twist drill procedure as a life-saving procedure in the emergency ward followed by minicraniotomy. The mean preoperative GCS was 10.76 (range 3–15) which improved to 13.04 (range 6–15) (mean difference -2.28) which was statistically significant ($p<0.001$) by paired t test. It was observed that in spite of the bleeding tendency as the patients were on antiplatelets and anticoagulants [1, 2, 10, 11], none of the patients had excessive oozing intraoperatively. The coagulogram done postoperatively showed a mean INR of 1.3 (range 0.8–1.8) (mean difference from preoperative INR being 1.5) which is statistically significant. We had no incidents of rebleed and none of our patients had recurrence on mean follow-up of 22.8 months (range 11–34 months). There was mortality in two patients on postoperative days 4 and 5 due to associated comorbidities, i.e., sepsis, and MODS.

Discussion

Chronic SDH is frequently encountered in neurological practice with a documented incidence rate of 1–2 per 100,000

population per year in the early CT era [12, 13]. However, according to newer studies, the incidence appears to be as high as 13.1 cases per 100,000 [14]. Patients older than 40 years account for 80 % of cases [15, 16].

Secondary coagulopathies due to antiplatelet drugs is an important risk factor for development of SDH [17]. Moreover, these patients are at a high risk of having excessive intraoperative bleeding, rebleeding in immediate postoperative period, and recurrence of SDH.

There is a paucity of literature about the preferred surgical technique in these patients to prevent rebleed and recurrence, and no specific protocol is defined for the reversal of the effect of antiplatelet and oral anticoagulant drugs. Jin–Lee et al. [10] have shown a rebleed rate of 41 % with a burr hole procedure in such patients and Bying Soo et al. [11] have shown a recurrence rate of 20.8 % with the same procedure.

We have defined a specific protocol for reversing the effect of antiplatelet and oral anticoagulant drugs and defined specific surgical technique for such patients. It was observed that none of the patients had excessive intraoperative oozing and none had rebleed and recurrence on follow-up. None of our patients had transfusion-related complications. It is noticed that the completeness of hemostasis was better with the visibility provided by the minicraniotomy and microscope and also loculations and septations were better handled with this procedure.

Thus, we suggest the specific dose protocol for reversal of the effect of antiplatelet and oral anticoagulant drugs and minicraniotomy with microsurgical membranectomy as a recommended procedure for patients having SDH who are on antiplatelet and/or anticoagulant drugs requiring emergency surgery. However, we do acknowledge the limitation of our study due to the less number of cases and the need for large studies for further refining the protocol.

Conflict of Interest The authors declare that they have no competing interests.

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