Case Report

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Anti-coagulants-induced intracranial hemorrhage managed with decompressive craniectomy: a case report of lesson learned

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Introduction and importance: Intracerebral haemorrhage (ICH) secondary to use of anti-coagulants is one of the fearsome complications. Haemorrhage within the intracranial space due to such anti-coagulants results in expansion of the intracranial bleeding despite the reversal of anti-coagulants. Hence, timely surgical intervention can be lifesaving.

Case summary: An elderly female who was undergoing management for her deranged coagulation parameters was found to be in a state of features suggestive of stroke. The patient was on regular anti-coagulants medication for her cardiology issues. Computed tomography (CT) scan showed intracranial haemorrhage, which underwent expansion on same day; hence decompressive craniectomy was done. During further stay in the ICU patient's Glasgow coma scale fluctuated but symptomatic improvement was noted. Anti-coagulants adjustment was made by a cardiologist and further, there was no expansion of intracranial bleeding within normal coagulation parameters.

Discussion: Anti-coagulants are rampantly used in several cases. Despite the several complications, there is a desperate need for such medications for the betterment of the patient's condition. Pharmacological management is a major modality in the reversal of oral anti-coagulants (OAC)-induced ICH, but in rare cases in the background of OACs-induced ICH, there occurs expansion of haemorrhage. Hence there is a need for neurosurgical intervention, whether it be minimally invasive surgery or decompressive craniectomy.

Conclusion: In the background of the low prevalence of OACs-induced ICH, there is an absence of a robust guiding treatment protocol. Furthermore, there exist minimal reported cases which underwent surgical intervention and resulted in a good prognosis.

Keywords: anti-coagulants, craniectomy, Intracranial haemorrhage

Introduction

Intracranial haemorrhage is one of the most dreadful complications of oral anti-coagulants (OACs). The annual risk of ICH in patients taking OACs is 0.25–1.1%, which is much higher when compared to the general individual such as the incidence rates of primary ICH in low-income and middle-income countries were 22 per million and in high-income countries were 10 per million person-years[1,2]. Higher mortality rates of up to 67% and associated severe disabilities have further decreased the prognosis of the patients[3]. Vitamin K antagonists and direct oral anti-coagulants are the group of drugs that are widely used in the management of deep venous thrombosis, pulmonary embolism, and prevention of ischaemic stroke and systemic embolism in patients with atrial fibrillation and mechanical heart valves. The risk of ICH is less in patients taking direct OAC (DOACs) compared to patients taking vitamin K antagonists (VKAs)[4]. Several randomized controlled trials have also shown that DOACs have a lesser incidence of resulting bleeding complications[5]. Rapid clinical deterioration is the culprit behind the need for urgent modality

HIGHLIGHTS

- Intracranial haemorrhage is one of the most dreadful complications of oral anti-coagulants (OACs).
- Among the group of oral anti-coagulants warfarin is considered the most rapidly used and most rigorously studied drug, accounting for 9–14% cases of ICH and 0.3–3.7% cases of warfarin-related intracranial haemorrhage (WRICH).
- Prevention of ICH expansion and emergent reversal of coagulopathy in OAT-induced ICH is not always the mainstay method of management.
- In rare cases, immediate surgical intervention can be a potential factor in saving the life of the patient.

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of treatment. Furthermore, prevention of ICH expansion and emergent reversal of coagulopathy in OAC induced ICH is the mainstay method of management, but in rare cases, immediate surgical intervention can be a potential factor is saving the life of the patient. This case report has been written in accordance with SCARE guidelines[6].

Case summary

We present a case of 52-year-old Asian Female with a past medical history of, rheumatic heart disease, valvular heart disease suggestive of severe mitral stenosis, aortic stenosis, tricuspid regurgitation, mild to moderate aortic regurgitation, atrial fibrillation since 12 years. There is a history of acute ischaemic stroke of posterior circulation and basilar artery segmental occlusion, which was managed pharmacologically. Seven months after the episode of stroke, the patient presented to the cardiology outpatient department for her regular visit, and during the regular investigation, we found severely raised Prothrombin time/International normalized ratio, activated partial thromboplastin time levels for which the patient was admitted. The patient underwent mitral and aortic valve replacement with repair of the tricuspid valve 2 months prior to the outpatient department presentation, for which she was taking tablet warfarin 12 mg once a day along with other supportive medications. Prior to and after the initiation of warfarin, the patient was on regular follow-up for her Prothrombin time/International normalized ratio levels. Her Prothrombin time/International normalized ratio at the time of admission was 108.9/9.55 . Her initial vital signs during admission were a temperature 97.4°Fahrenheit, blood pressure 130/90 mmHg, heart rate 84 beats per min, respiratory rate 28 times per min, oxygen saturation 97% on room air. On physical examination, the patient was alert and followed commands intermittently; extraocular movement was intact bilaterally, and pupils were equal and reactive bilaterally with a Glasgow coma scale (GCS) of 15/15. Cranial nerve examination did not reveal any significant findings. The patient was undergoing conservative management with adjustment of anti-coagulants medications by a cardiologist. On the third day of admission, in the early morning, there was a history of acute onset decrease in verbal response of the patient; as such, she was not responding to any commands, the patient was drowsy, altered sensorium, deviation of angle of mouth to right side with GCS of E4V1M6. On neurological examination, her left upper limb power was 4/5, right lower limb 5/5, left lower limb 4/5 and right lower limb 5/5, pupils bilateral 2 mm round and reactive to light, reflexes were also brisk and bilateral plantar reflex up going. The patient was transported to computed tomography (CT) immediately. CT head revealed an acute right-sided frontal haemorrhage with features suggestive of air-fluid level within, which is typical for anti-coagulants-induced intracranial haemorrhage (Fig. 1). When the patient returned from CT, in few hours patient suffered from epistaxis with a further drop in GCS to E1V1M4 hence was shifted to ICU and was intubated. Anti-seizure medications were initiated for the prevention of seizures. A repeat CT scan of the head was done on the same day, which showed haematoma expansion (Fig. 2). Since the patient was on warfarin and LMWH, it was stopped after CT confirmation of anti-coagulants-induced ICH to prevent further expansion of haemorrhage. On the second day after the event, the patient was planned for right front parietal decompressive craniectomy and evacuation of right frontal parietal haematoma. (Fig. 3) Postoperatively patients' GCS was improving, but the verbal response was still not present. Due to multiple episodes of waxing and waning of GCS, tracheostomy was done after 6th postoperative day after decompressive craniectomy. Further, in subsequent days, the patient was being managed in ICU with a multidisciplinary approach from the department of cardiology and neurosurgery in terms of adjustment of anti-coagulant medication by completely stopping the Tab warfarin that she was taking and starting low molecular weight heparin, Enoxaparin 30 mg once a day and prevention of further expansion and reoccurrence of haemorrhage. Later, after the patient got stabilized hemodynamically as well as symptomatically along with coagulation parameters within normal range, a repeat CT scan of the head was done on 28th postoperative day (Fig. 4), suggestive of resolving haematoma and no re-expansion of haematoma, the patient was on regular physiotherapy and prompt adjustment of anti-coagulants . Patient was discharged from ICU on 14th POD and from the hospital on 36th postoperative day. During discharge, her GCS was E4 (spontaneous eye opening), V1 (patient under tracheostomy), M6 (obeys the commands). The patient was asked to come for the first follow-up in 2 weeks and was on regular 2 weekly follow-ups. During the follow-up patient's GCS was E4 (spontaneous eye opening), V1 (patient under tracheostomy), M6 (obeys the commands.

Discussion

With the increasing trend of patients taking anti-coagulants worldwide, there has been a rise in cases of complications such as ICH and atrial fibrillation being the major cause behind the use of oral anti-coagulants[7]. Among the group of oral anti-coagulants warfarin is considered the most rapidly used and most rigorously studied drug, accounting for 9–14% cases of ICH and 0.3–3.7% cases of warfarin-related intracranial haemorrhage (WRICH)[8,9]. Anti-coagulants related intracranial haemorrhage can present in either spontaneous form or traumatic and can anatomically exist in different intracranial compartments such as epidural haemorrhage, subdural haemorrhage and intracranial haemorrhage. However, the literature on extra parenchymal haemorrhage has been reported less, furthermore more scarcely reported are the cases of ICH secondary to anti-coagulants that have been managed with surgical intervention, mostly treatment from a neurosurgical point of view, which have been described in our patient[10].

Compared to age-matched cohorts not taking anti-coagulants, the risk of ICH in patients under anti-coagulants is 8–11 times higher[11]. Regarding the risk factors associated with ICH in patients taking anti-coagulants, advanced age (> 70 years),hypertension, concurrent use of dual anti-platelets, supra therapeutic levels of anti-coagulation, early period after warfarin initiation, associated leukoaraiosis are the major ones[12,13], Compared with other anti-coagulants warfarin and enoxaparin is associated mostly with ICH as depicted by RE-COVER (Efficacy and Safety of Dabigatran Compared to Warfarin for 6 Month Treatment of Acute Symptomatic Venous Thromboembolism) trial, ROCKET-AF (Rivaroxaban Once-daily Oral Direct Factor Xa Inhibition Compared with Vitamin K Antagonism for Prevention of Stroke and Embolism Trial in Atrial Fibrillation), EINSTEIN-PE (Oral Rivaroxaban Alone for the Treatment of Symptomatic Pulmonary Embolism)

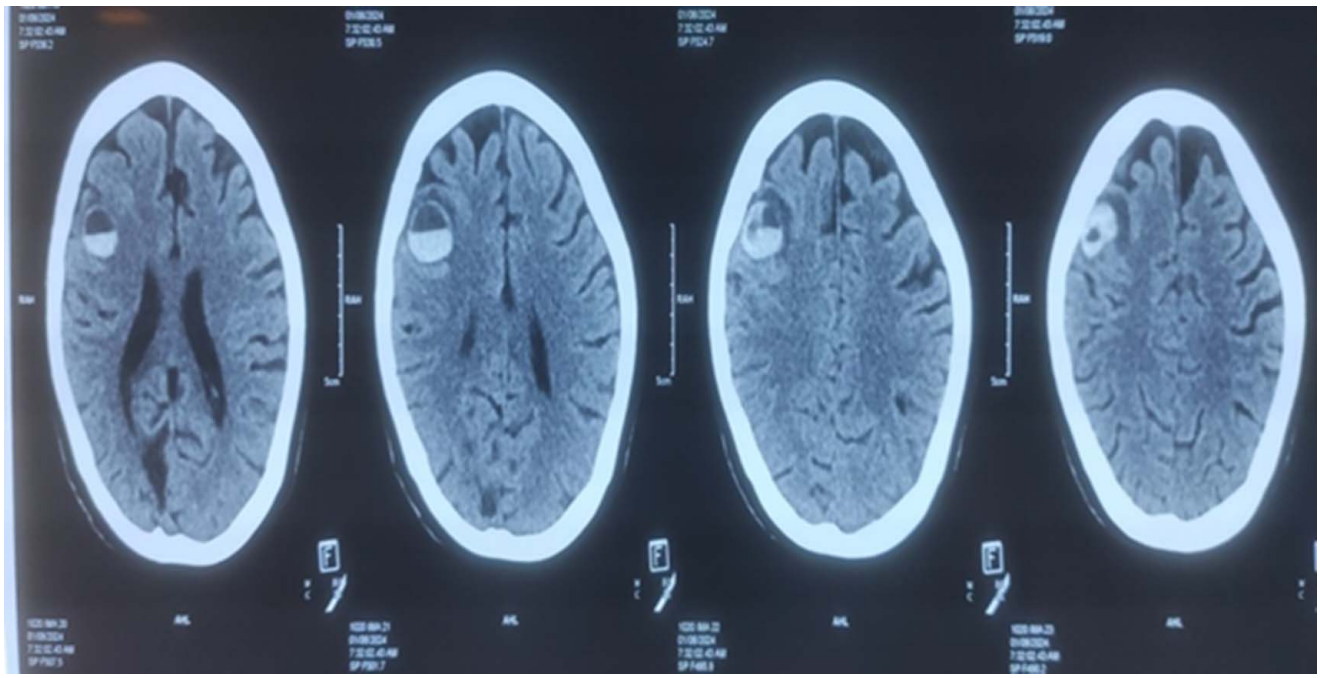

Figure 1. Computed tomography head suggestive of hyperacute parenchymal lobar haemorrhage showing haematocrit effect and measuring 8 cm^3 in right frontal lobe with minimal perifocal oedema.

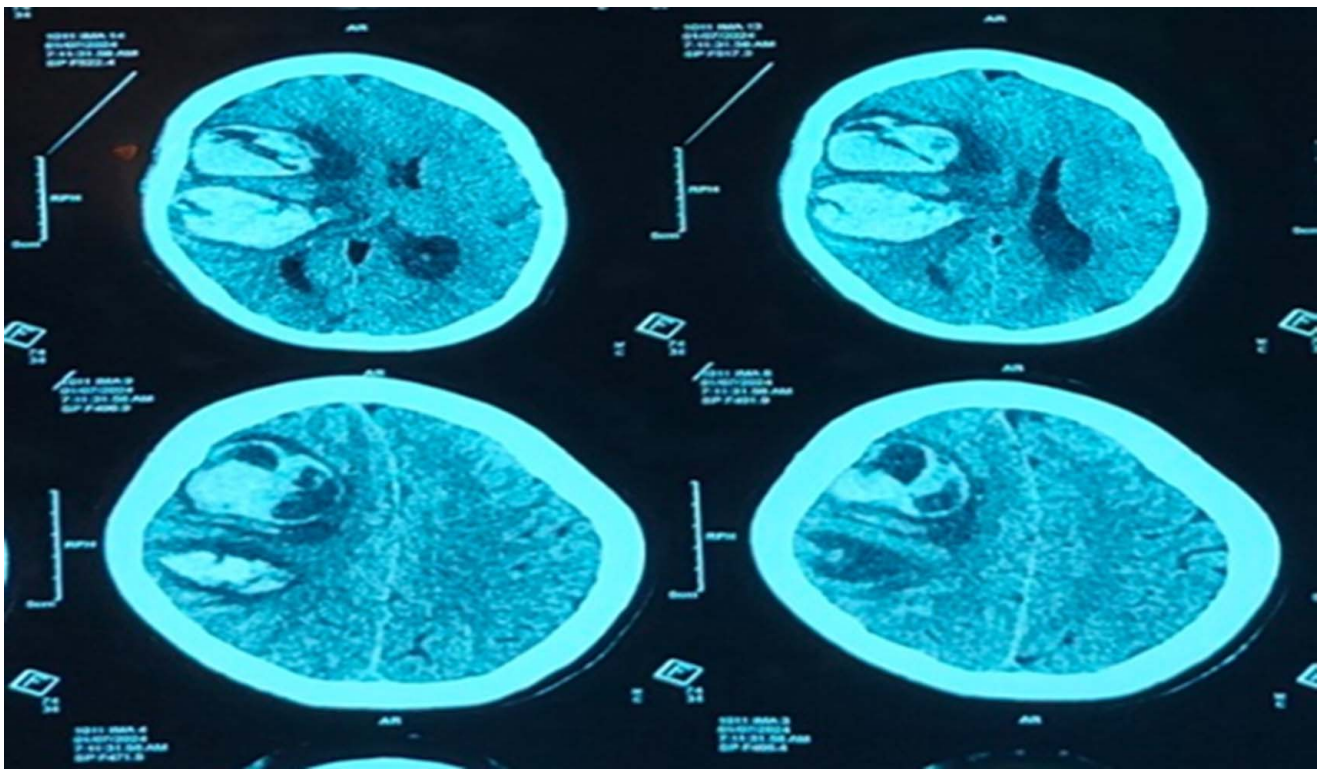

Figure 2. Computed tomography head suggestive of two large epicentres of acute parenchymal haemorrhage measuring 41 cm^3 in right frontal lobe and 32 cm^3 posterior to it in right temporo parietal lobe with perifocal hypoattenuation.

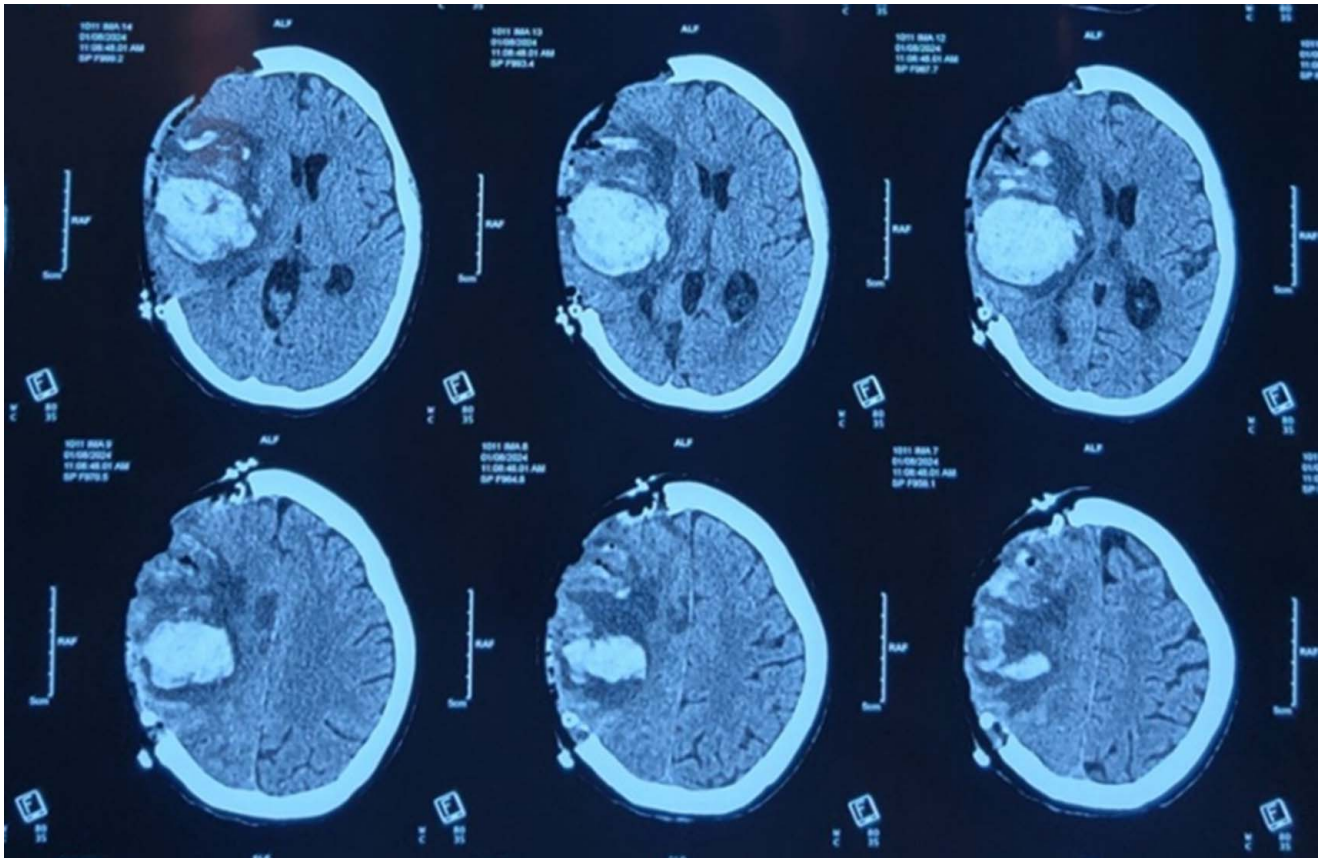

Figure 3. Computed tomography head post right fronto parieto temporal decompressive craniectomy and evacuation of right fronto parietal haemorrhage with features suggestive of mild dural bulge, minimal resiudal haemorrhage anteriorly, perifocal oedema, midline shift measuring 5 mm with minimal surrounding oedema.

trial—a study that compared the efficacy of rivaroxaban with that of enoxaparin followed by warfarin in patients with pulmonary embolism[14-16], In cases of anti-coagulants-induced brain haemorrhage, expansion of haematoma after the initial patient presentation is mostly of progressive nature which can even persist beyond 24 h in anti-coagulated patients, which can be correlated from the patient in our case[17]. Moreover, despite the rapid correction of coagulopathy, there is still a high chance of haematoma expansion[18]. The limitation in our case is that ICH resulted from OAC, but due to her cardiovascular comorbidity, we had to start the anti-coagulants again in higher doses. Hence, the alternative modality was not sought after, which might bring about a decrease in the risk of ICH in the future.

Several uncertainties' that unfold in the prompt management of intracranial haemorrhage associated with anti-coagulants. The established hurdles include a paucity of robust evidence and limited guidelines for the treatment of such disastrous conditions. Along with this, there lies individual variation in response to pharmacological treatment, and further difficulty in assessing the ongoing bleeding makes it more unmanageable to develop a healthy prognosis[19]. Supportive care, including blood pressure control and reversal of anti-coagulation remains the cornerstone of acute management of anti-coagulants induced. However, Keep in mind that the mere correction of coagulation parameters only will not reverse the condition as seen in our case, where even after the correction of coagulation parameters, there was still the expansion of haematoma. Hence, surgical intervention, despite consisting of fearful complications, can be sought after for acute management. Approximately 9.5–33% of patients with coagulopathy-induced ICH require neurosurgical intervention, but there is very scanty reported evidence guiding the surgical management[20,21]. There exists a debate between minimal invasive surgery and craniotomy for the treatment of anti-coagulants-induced ICH in terms of postoperative re-bleeding rates, morbidity and mortality rates, Postoperative Glasgow Outcome Scale Extended (GOSE), and modified Rankin Scale (mRS) scores along with functional outcomes[22]. The potential weakness of our case report is the shorter period of follow-up after the patient is discharged from the hospital, so it is quite difficult to assess the prompt functional outcomes of the intervention done based on a few months period only. Despite the good prognosis of minimally invasive surgery in regard to long-term functional outcomes, our case sheds light on decompressive craniectomy surgery for coagulopathy-related ICH by demonstrating that with meticulous perioperative medical management and well-selected surgical options, ICH can be evacuated safely and effectively from patients with coagulopathy.

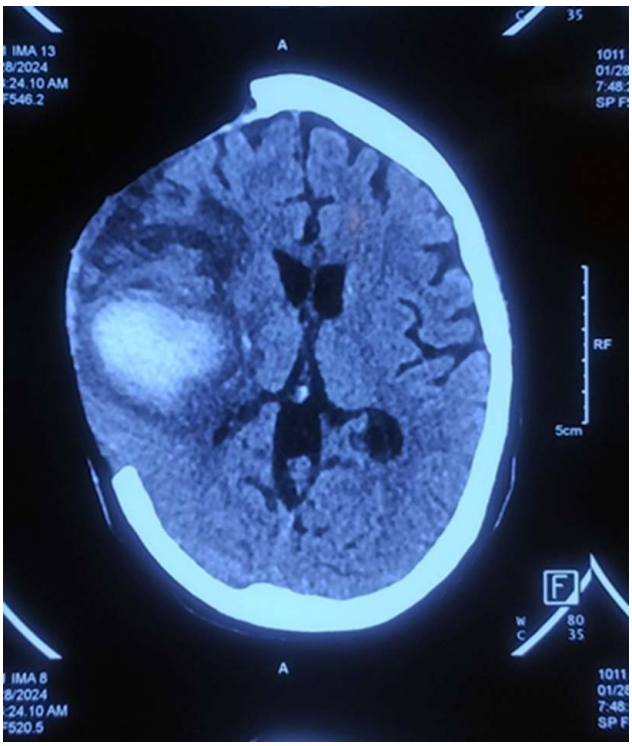

Figure 4. Computed tomography head of the patient before getting discharged with features suggestive of decompressive craniectomy changes in right fronto parietal area, minimal residual haemorrhage in right frontal lobe with trace oedema without any midline shift.

Conclusion

Intracranial haemorrhage associated with the chronic use of anticoagulants is one of the major neurosurgical emergencies that requires urgent, prompt intervention in order to prevent the mortality and severity of disability. The available medical literature has reported various pharmacological modalities for managing such tedious cases. However, surgical interventions have also shown promising results in terms of the role of minimal invasive surgery and craniotomy in bringing about good prognosis, but there is scarce reported data on safety, efficacy and prognosis; hence, through this case, we have tried to delve into the lessons learned in terms of managing such rare cases through updated treatment modalities so as to uplift the prognosis and care of the patient.

Ethical approval

Ethical approval is exempted in case of case reports in our Institution. Whereas written informed consent have been taken from patients herself.

Consent

Written informed consent was taken from patient herself and can be made available if asked upon by chief editor.

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Author contribution

S.G., S.S., A.M., D.S.: study concept, case presentation formulation, manuscript writing and review. S.S., S.S., B.J., P.C.: patient diagnosis and management ,study concept, manuscript review. S.G., A.M.: manuscript review, discussion writing. B.J., P.C.: introduction writing , manuscript review.

Conflicts of interest disclosure

The authors declare no conflicts of interest.

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This entitled paper was not invited.

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