An unusual combination of complications in a pediatric burn patient with successful outcome

ABSTRACT
Accidental burns is one of the most commonly encountered condition in our society. Women and children are often affected. The case being discussed is of a burn victim who had a series of unexpected and rare life-threatening complications. The child developed complications of actively bleeding duodenal stress ulcer, deep-vein thrombosis, and heparin-induced thrombocytopenia with thrombosis in addition to bacterial sepsis, during the hospital stay. All the complications that the child endured were unfortunate though not uncommon, and with the help of accurate diagnosis, treatment, and multidisciplinary team approach, we were able to save the child and enable him to lead a normal life.

Keywords: Deep-vein thrombosis, heparin-induced thrombocytopenia and thrombosis, pediatric burns, stress ulcer

INTRODUCTION
The case being discussed is of a burn victim who had a series of life-threatening complications. It highlights the need for a high index of suspicion when treating burns patients even while following the established protocol of treatment as it is a state of extreme physiological stress for the body.

CASE REPORT
An 18-month-old male child presented to the emergency department with 35% total body surface area (TBSA) second-degree scald burns (Lund and Browder assessment), 2 h after an accidental spillage of hot water over the body. He was admitted in burns intensive care unit and intravenous Ringer’s lactate as per Parkland formula was initiated. Wound debridement with removal of blisters and biological membrane (antibiotic-treated and glycerol-preserved amniotic membrane) application were done [Figures 1 and 2]. The postoperative period was uneventful. Oral feeds were initiated on the 2nd day with high-protein high-calorie diet. The patient showed good improvement with satisfactory healing of burns wound.

On day 5, the patient developed multiple episodes of melena and hypotension. Hemoglobin (Hb) dropped to 2.9 g/dL and he was pale with cold extremities. Bolus intravenous fluids were given along with multiple packed cell transfusions. Emergency endoscopy revealed a duodenal ulcer with a clot at its base in the posterior wall of the D2 segment, for which clipping was done [Figure 3]. Over the next 3 days, the patient was stable, with Hb level rising to 9 g/dL.

On day 8, the patient had another episode of melena with coffee brown aspirate through feeding tube, with Hb dropping to 7 g/dL. Computerized tomography angiography showed bleeding from the gastroduodenal artery [Figure 4], which was embolized and microcoiling was done [Figure 5].

Central venous catheter (CVC) site was initially inserted in the right femoral vein, which was shifted to the left femoral vein.

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Nair, et al.: A rare case of pediatric burn following blockage. Postoperatively, the child had a single episode of melena and a radioisotope scan was done which ruled out an active gastrointestinal (GI) bleed. Over the next 2 days, the patient developed fever spikes, and blood culture grew methicillin-resistant *Staphylococcus aureus*. Vancomycin 200 mg (20 mg/kg) as intravenous infusion 6th hourly was started as per culture sensitivity.

Two days later, edema of the right lower limb was noticed and venous Doppler confirmed the presence of deep-vein thrombosis (DVT) involving the right femoral and external iliac vein. He was started on heparin infusion (200 IU/hour) with hourly monitoring and dose titration with activated partial thromboplastin time values. The following day, he developed DVT involving the left external iliac and common iliac veins sparing the inferior vena cava and a small splenic infarct. The patient had a significant drop in platelet count (22,000 cells/cumm), and the possibility of heparin-induced thrombocytopenia and thrombosis (HITT) was considered (based on 4T score). Heparin was discontinued and warfarin (1 mg daily initially and increased to 2 mg daily at 0.1–0.2 mg/kg) was started with fondaparinux (1 mg subcutaneously daily at 0.1 mg/kg) as bridge therapy. Serial ultrasound monitoring of lower limbs was done to exclude progression of thrombus. His platelet counts also showed gradual improvement.

Two days later, the patient became febrile and repeat blood culture grew *Escherichia coli*. Antibiotic was changed to meropenem 200 mg intravenous 8th hourly (20 mg/kg) and colistin 1.5 lakh units intravenous 8th hourly. By day 23, his general condition improved and he was discharged on day 30 [Figure 6]. Warfarin medication was continued along with regular monitoring of International Normalised Ratio (INR), which was maintained between 2 and 3. Subsequent follow-up scans revealed good venous return bilaterally and anticoagulant therapy was continued for 6 months. Burn wounds have healed well with good-quality scar.
DISCUSSION

This case is being presented because of the rare set of complications that have occurred in this burns victim. Literature search failed to reveal a case in which this combination of complications of a pediatric burn with duodenal ulcer, venous thrombosis, and HITT was reported. Abbreviated burn severity index is frequently used for diagnostic accuracy in predicting the chance of stress ulcer formation in burn patients. The rate of ulcer was found to be higher in patients with more than 20% TBSA burns. Stress ulcer erosions of stomach and duodenum and upper GI bleed are well-known complications in critically ill children; however, the incidence is relatively rare as compared to adults. Reduced gastric blood flow, mucosal ischemia, and reperfusion injury are some of the mechanisms contributing to stress-related mucosal damage. The alarm symptoms include sudden abdominal pain, black tarry or bloody stools, and bloody or coffee-like vomit. Upper GI endoscopy is the preferred diagnostic tool to detect the presence, site, and degree of bleeding and to attempt hemostasis by direct measures if required.

The incidence can be reduced by a combination of proper fluid resuscitation, proton-pump inhibitors, and early initiation of enteral feeds, which increases the intragastric pH. Our patient developed bleeding duodenal ulcer despite accepted resuscitative measures and endoscopic clipping had to be done.

Duodenal ulcers are more frequent than gastric ones. Surgery is the treatment option failing endoscopic hemostasis. Angiography and embolization procedures are considered the gold standard. Embolization of the bleeding gastroduodenal artery was performed. In the course of hospital stay, this patient developed DVT over both lower limbs. DVT is usually diagnosed in critically ill children when they present with symptoms of acute inflammation or venous congestion. Venous Doppler is the most commonly used diagnostic tool for DVT. The presence of CVC is the single most important risk factor for DVT in children. In acute setting, goals of therapy include reestablishing flow through the occluded vessel, preventing thrombus extension, and embolism.

Low-molecular-weight (LMW) heparin is the preferred drug for treatment and has the advantage of having lower risks of bleeding and HITT compared with unfractionated heparin (UFH). HITT is a prothrombotic, immune-mediated complication of unfractionated or LMW heparin therapy and is characterized by moderate thrombocytopenia 5–10 days after initial heparin exposure (which, in this case, was during the angiogram procedure), with increased risk of venous and arterial thrombosis. Laboratory testing for suspected HITT is limited, and hence, clinical scoring systems such as 4Ts score and HIT Expert Probability score have been developed. We used the 4Ts score [Table 1] and our patient had a score of 8, suggestive of high probability of HITT. The management includes immediate discontinuation of all sources of heparin and the initiation of alternative anticoagulant. Fondaparinux is a direct factor Xa inhibitor, which does not interact with platelets, and thus does not trigger HITT and its use has been studied in children. In a study by Obeng et al., it was concluded that even though children have significantly lower risk (prevalence of HITT is 0.047%) than adults for developing HIT after UFH exposure; unfortunately, thromboembolic complication is the most common presenting symptom in pediatric patients.

CONCLUSION

A majority of the complication of duodenal ulcer in burns patients is avoided by the initiation of early enteral feeds, fluid resuscitation, and proton-pump inhibitors. However, it...
Table 1: 4T score for assessing heparin-induced thrombocytopenia and thrombosis probability

| Category                        | 2 Points                                      | 1 Point                                      | 0 Point                                      |
|---------------------------------|-----------------------------------------------|----------------------------------------------|----------------------------------------------|
| Thrombocytopenia                | >50% fall, or nadir >= 20×10⁹/L               | 30-50% fall, or nadir 10-19×10⁹/L            | <30% fall, or nadir <10×10⁹/L                |
| Timing of the decrease in platelet count | Day 5 to 10, or <= day 1 with recent heparin (past 30 days) | > Day 10 or timing unclear, or < day 1 if heparin exposure within past 30-100 days | <Day 4 (no recent heparin)                      |
| Thrombosis or other sequelae    | Proven thrombosis, skin necrosis, or acute systemic reaction after heparin bolus | Progressive recurrent or silent thrombosis; erythematous skin lesions | None |
| Other causes of thrombocytopenia | None evident                                  | Possible                                      | Definite                                     |

is possible that rare scenarios may arise where complications develop in spite of these measures and treating doctors must always be on the lookout.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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