

## Electrocution Causing Descending Colon Perforation – A Rare Case Report

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**Abstract:** Electrocution injuries have been classified into low tension (<1 kilo Volt) and high tension injuries (>1 kilo Volt). Usually electrocution injuries will have an entry wound at the site of contact and an exit wound where the current passed out. Bowel perforation due to an electrocution is a rare and serious injury. We report a case of high tension electric current burn on both hands (entry wound), and exit wound in right foot with perforation in the descending colon presented late with peritonitis and successfully managed by diversion colostomy and take down.

**Keywords:** Electrocution, bowel perforation, descending colon perforation

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### I. Introduction

Colonic perforation due to an electrocution is a rare and dreadful complication. Previously few cases of electric current injury followed by enterocutaneous fistula were reported<sup>[1]</sup>. Extensive Medline search revealed very limited cases of electric current induced enteric perforation. Such enteric perforations have a potential to progress as coagulative necrosis of intestines/gall bladder, liver failure, gastrointestinal hemorrhage from stomach and duodenal ulcers, curling ulcers, acute appendicitis, pancreatitis, small bowel perforation, splenic injuries and mesenteric abdominal trauma<sup>[2]</sup>, if overlooked. Here we report a case of an electrocution causing perforation of descending colon in an otherwise stable patient.

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### II. Case profile

A 40 year old male, construction worker by occupation, history of high tension electric current that he sustained while using a crowbar which accidentally came in contact with a high tension electric wire (Direct Current). The patient had received first aid and was kept under observation and managed conservatively following which he was discharged in a nearby hospital. 3 days later, he presented to us with complaints of abdominal pain and progressive abdominal distension. On physical examination there was second degree burns in the palmar aspect of both hands and third degree burns involving great toe, 2<sup>nd</sup> and 3<sup>rd</sup> toes of right foot (Fig.1). There was no restriction in the movement of joints. On clinical examination he appeared dehydrated, having tachycardia (110/min). Blood Pressure was 100/60 mm of Hg and respiratory rate was 25/min. On physical examination, the abdomen was tender, distended and guarding(+) with positive rebound tenderness (Peritonism). Bowel sounds were sluggish. X-ray abdomen revealed pneumoperitoneum and CT abdomen revealed – thickening in descending colon with fat stranding, free fluid noted in the peritoneal cavity with basal atelectasis<sup>[3]</sup>. ECG showed sinus tachycardia with no other electrical changes. Total count was elevated with urine routine revealing microscopic hematuria. Doppler study of the right lower limb was essentially normal with triphasic flow.

### III. Management

Patient underwent Immediate exploratory laparotomy for hollow viscus perforation. On exposing the abdominal cavity there was about 500 cc of black coloured fluid due to charred tissues mixed with peritoneal fluid. Stomach was normal. Small and large intestine were congested and edematous. Other solid organs were normal. There was a perforation of size 2 x 1.5 cm on the antimesenteric part of descending colon approximately 7 cm below splenic flexure. The margin of the perforation was charred and necrosed due to electrocution. There was contamination in the left paracolic gutter and pelvic cavity. Since there was extensive involvement operative decision of protective diversion colostomy was made and proceeded (Fig.3). Left paracolic drain was kept and abdomen was closed in layers.

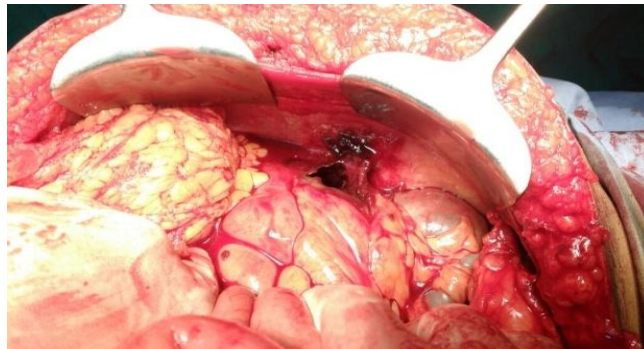
Post operatively, the patient was shifted to ICU since we had difficulty in extubating the patient. He was managed with higher antibiotics and inotropic supports for the initial two days and was weaned progressively. He was shifted to the ward on the fourth day. The patient's right foot showed gangrenous changes and the vascular surgeon opinion was sought and they advised to go for amputation of the gangrenous toes and proceeded<sup>[5]</sup>. Post period was uneventful and was discharged on 12<sup>th</sup> post operative day.

### IV. Figures and Tables



Fig.1 – Entry and exit burn wound due to high voltage electrocution

A.



B.



Fig.2 – Intra op findings showing perforation of descending colon (A) and the congested intestine (B)



Fig.3 – Diversion colostomy

### **V. Discussion**

Electrical burn patients account for approximately 5% of the hospital admissions in major burn centres. High voltage currents (>1000 volts, 50Hz) can occur either directly or indirectly through conductive materials or equipments. Both direct and indirect current causes injury and its severity is determined by the voltage, current intensity, types of current, the current pathway, the duration of exposure, the resistance of tissues, contact surface, the extent of multi-system involvement and the circumstances surrounding the incident. During electrical burn, electric current is passed through underlying structures thereby causing coagulative necrosis and cell membrane rupture. As current passes through tissues, electricity generates heat according to Joule's law; Heat (Joule,J) =  $I^2(\text{current}) \times R$  (Resistance). The increase in temperature causes the denaturation of macromolecules which is usually irreversible. However, the resistance of the tissues during the passage of an electrical current is variable (lower for nerves and vessels and higher for fat and bones) and the trauma done by an electrical current varies according to the individual susceptibility and the quality of care provided at the site of the accident. Visceral injuries are usually disproportional (rare but severe) to the body surface burned and injuries at the entrance and exit site of the electrical current are found in the surviving individuals. Visceral lesions require active intervention and are associated with high morbidity and mortality. Therefore, visceral injuries should always be remembered in the case of electrical burns and should be managed adequately by a multidisciplinary team<sup>[4]</sup>. The colon and small intestine were the organs most frequently affected. Less frequently involved organs were the heart, esophagus, stomach, pancreas, liver, gallbladder, lung, and kidney. Depending upon the extent of the perforation and its anatomical site, as well as on the basis of the presence of diffuse or localized peritonitis, the treatment of perforation will vary from simple suturing, with or without a protective colostomy, to exteriorization in the form of a colostomy, and the Hartmann operation. In our case entry wound was in both hands and exit wound was on the right foot with perforation of the descending colon since the patient was not wearing any shoes at the time of the incident and this type of entry and exit is a rare presentation which hasn't been so far documented in the literature as we have gone through. According to literature sources studied, most of the perforations due to electric current were involving the colon particularly the descending or sigmoid colon, the reason for which is still rarely understood<sup>[5]</sup>. Since the patient presented late and there was charring of the tissues, primary anastomosis couldn't be made and so patient underwent diversion colostomy and anastomosis as a second stage procedure.

### **VI. Conclusion**

Visceral injuries are rare in electrical burns victims, but they are often overlooked in an electric current injury, especially in cases of high voltage currents. Early diagnosis is the key for successful management in these patients. Prompt diagnosis with immediate active management of electrical burns patient presenting with colonic perforation within 12 hours, can be successfully managed by primary repair and if presented late, diversion colostomy followed by take down is the successful management

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