CASE REPORT

Diathermy Malfuncton May Increase the Patient's Body Temperature without Leading to Burn

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INTRODUCTION

Surgical diathermy units generate an ultra high frequency electrical current for cutting or coagulation of tissues. Malfunction of different parts of diathermy in some way or the other have been known to cause harm to the patient. Such problems can be avoided by vigilance and proper check up of electrosurgical units. We present a case of diathermy return electrode malfunction which lead to an increase in the body temperature of the patient but did not cause burns.

CASE REPORT

A 25 years old male presented with pain in the right iliac fossa, fever and vomiting for the last 01 day. After diagnosis of acute appendicitis, he was scheduled for appendicectomy under general anesthesia. After application of patient monitors and establishment of anesthesia, surgery was started. During the procedure his radial pulse was intermittently monitored as a routine matter. While feeling his pulse, it was suddenly noticed that the skin of the patient was warm as compared to his initial condition. The general condition was stable and on a search for any abnormality, nothing significant was noticed. Haemodynamically he was stable and there was no sign of hypoxia or pain. Meanwhile the feeling of warmth disappeared. This incidence was of very brief duration and everything appeared to be normal. However, considering something was wrong somewhere, we started searching for some cause of this problem but found nothing. After sometime the same rise in temperature of the patient was felt again and rest everything was normal. Considering it to be some fault with the judgment on the observer side, an assistant was asked to feel for the change in the temperature of patient, who confirmed the rise in temperature. When the same phenomenon happened for the third time, it was noticed that this change in temperature of the patient was related to diathermy use, because everything was normal but when the diathermy was being used, the temperature of patient started rising. The surgeon was informed about this problem, the use of diathermy was stopped and its power supply was disconnected. The rest of the surgery was uneventful and the problem never recurred throughout. The patient recovered smoothly from anesthesia. The return electrode plate of diathermy was examined and found to be deformed and twisted and only partially connected with the lead of diathermy. This faulty plate and the joining lead cable were discarded and the phenomenon never occurred again.

DISCUSSION

The surgical diathermy is very effective surgical tool being used for cutting, coagulation and fulguration in about 80 % of all surgical procedures.[1] It uses high frequency electric current to produce heat which is used to cut or coagulate and destroy tissues. Electrical frequency used by diathermy is in the range of 300 kHz to 3 MHz and patients body forms part of the electrical circuit[2]. In monopolar diathermy an electrical plate is placed on patient and acts as indifferent electrode and current passes between the instrument and indifferent electrode, thus localized heating is produced at the tip of the instrument and minimal heating effect is produced at indifferent electrode.[2,3] To prevent diathermy burns, the indifferent electrode is firmly and evenly applied to a

large area of skin over the back, buttock, thigh or calf. Since the introduction of the first successful unipolar electrocautery by William T. Bovie in 1928, and the bipolar electrocautery by Greenwood in 1939, a number of thermal hazards have been realized and reported in literature[4]. Although the overall incidence of recognized aberrant electrocautery burns is between 1 and 2 per thousand operations, reports of unintended electrosurgical thermal injury are rare. There are 4 categories of these burns[5].

1. Direct contact burns in the operative field result from imprecise active electrode use.
2. Improper placement or attachment of the grounding electrode can lead to burns at the site of indifferent electrode attachment.
3. Electrosurgical units can heat pooled solutions, resulting in thermal injury. Burns have been attributed to solution heating by both the active and the indifferent electrode.
4. Aberrant intraoperative circuits can be generated by monitoring or operative equipment contacting the patient's body, leading to thermal injury at sites of contact remote from the operative field.

The case we have reported does not fit in any of the above categories as there was no thermal injury or any burn to the patient. There was generalized warming up of the patient for a brief period while electrocautery was being used and the patient remained normal at times when electrocautery was not used. The exact cause of this problem could not be ascertained and what we found at the end was partial contact of electrocautery lead to indifferent electrode which was also deformed. The indifferent electrode was made of lead, covered in cotton cloth and was applied to the left buttock. Analyzing the literature we did not find supportive literature which could explain our findings in this case. The search of literature revealed that malfunction of the electrocautery can result into four types of burns to the patient as mentioned above. The body warming by the electrocautery can be explained by considering that the electrocautery circuit was not completed during its use and the current which has to spread out through the indifferent electrode was dispersing into the patient. Normally when the device is applied to the patient, the current will flow from the point of contact and will spread out as it passes through the patient, heading for the 'return' pad, which is usually attached to the patient's thigh. From there it runs back to the diathermy machine, so completing the circuit. The greatest current per cubic cm of tissues will be at the point of contact of the active electrode; away from the immediate point of contact of the active electrode, the current spreads out. Historically the most frequently reported patient injury has been skin injury e.g., burn at the dispersive electrode site[6]. In our case the current was increasing the patient temperature which is contrary to what is available in literature. To our knowledge, this is the first reported case of electrocautery malfunction resulting into increased body temperature of the patient.

CONCLUSION

Recommendations are made to properly select instruments for the OR and the individuals operating this should be well conversant with the manuals and warnings before use. Most of the damage results due to poor storage or improper maintenance. So to avoid these hazards, accessories must be regularly checked and discarded if damaged. Records of the numbers of autoclave cycles should be maintained where appropriate. Careful storage is essential to ensure that equipment continues to function correctly throughout its product life.

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