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Sharing Experience: Risky Removal of UXO - Case Report

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Abstract: **Case Report**

***Introduction*:** The management of a patient with embedded unexploded ordnance (UXO) have been described in wartime since the Korean War. To our knowledge, this is the unusual event, but it may cause many challenges and tension to medical treatment facility, including operating surgeon. ***Case report*:** We reported about a successful removal of UXO from a soldier. ***Discussion*:** To our knowledge, there are only a few published reports and studies regarding UXO embedded in patient. Some literatures recommend the principles of management for a combat patient with UXO. In our case, we successfully removed UXO without catastrophic collateral damage by applying these principles as well as shared decision with patient. ***Conclusion*:** Regarding management of a patient with UXO, even though the standard operating procedures and guidelines are present, we have to manage according to the sound clinical judgment depend upon the multiple factors including patient concern. The flexibility with common senses and familiarity with war related surgery are also keys for better outcomes in this rare and weird problem.

Keywords: UXO, War Surgery, Combat Patient.

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INTRODUTION

The unexploded ordnance (UXO) can be defined as military munitions that have been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and that remains unexploded by malfunction, design, or any other cause (Hawks, L. C. R. 2017). The management of a patient with embedded UXO have been described in wartime since the Korean War. To our knowledge, this is the unusual event, but it may cause many challenges and tension to medical treatment facility, including operating surgeon (Oh, J. S. 2007). This may be unquestionable that management of a patient with retained UXO is tricky and mentally testing for surgeons. There is undeniable emotional pressure on patient and the surgical team (Lein, B., *et al*., 1999). Even though the standard operating procedures are written, this situation requires flexibility, common sense and constant reassessment (Oh, J. S. 2007). We report our personnel experience of removing UXO 40 M grenade from a soldier.

Case Report

A soldier of his 40s was injured by a 40 mm grenade due to missed fire at a close range from an MA-4 grenade launcher. He obtained open comminuted fracture upper one third tibia of his right leg with retained UXO. He was transferred our tertiary hospital in Southern Shan State of Myanmar. After getting the prior information of a transfer of this patient, we alerted the local Explosive Ordnance Disposal (EOD) team. On arrival to the emergency room, patient was fully

conscious and hemodynamically stable. His right leg was well dressed and immobilized with Thomas splint. He was in pain but his distal neurovascular status was intact. There was an entrance wound measuring 3 cm x 2 cm over the medial aspect of the right calf, one hand breath below the knee joint with no exit wound. There was no active bleeding. He was given initial treatments according to the advanced trauma life support (ATLS) guidelines. Plain X-ray study showed embedded 40 mm grenade with fuse intact and comminuted fracture of upper one third tibia (Figure 1).

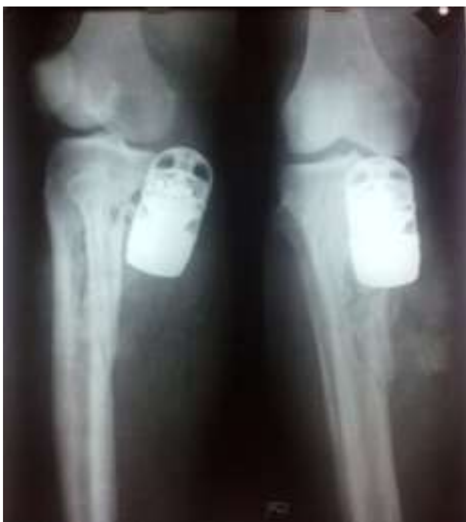

Figure 1: Embedded 40 mm grenade in the right leg of patient

We discussed with EOD team and it was identified that this grenade has the significant risk of detonation. According to the guidelines, the en-bloc resection, i.e. amputation above the knee was the quickest and safest way to remove this grenade UXO. We explained to the patient and he wanted to save his limb as much as possible. Finally, we had to try to remove this UXO with no collateral explosion. All nonessential staff and personnel were removed out of the operating theatre. Any equipment with potential of explosion and combustible such as anesthetic gases and oxygen cylinder were removed temporarily from theatre. By using regional anesthesia, we removed the grenade without using electronic and mechanical devices such as diathermy and suction machine. There were only four personnel in the operating theatre during operation including bomb squad personnel. After taking out the grenade, it was handed off to bomb squad personnel. Then we performed the thorough wound debridement and stabilization of fracture (Figure-2).

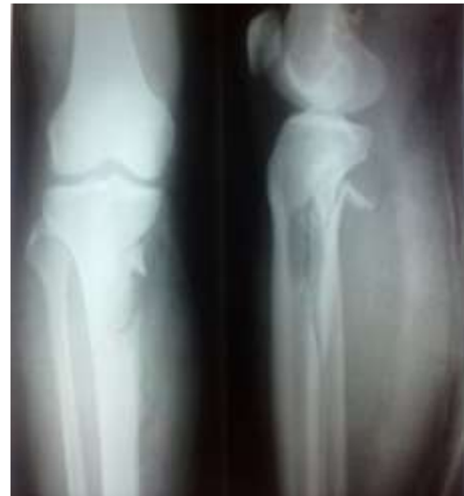

Figure 2: Successful removal of UXO

Then, we handed over this patient to the orthopedic team for further management of open fracture tibia. His postoperative recovery was well and uneventful.

DISCUSSION

To our knowledge, there are only a few published reports and studies regarding UXO embedded in patient (Waqas, A., *et al*., 2012). The management of a patient with UXO is risky and weird. Some literatures recommend the principles of management for a combat patient with UXO, including: (1) determination of device type with plain film radiography, (2) minimizing rotational and vibratory movement, (3) strategic isolation of the patient from the hospital facility, hospital personnel, and other patients. It is essential to treat those patients without risking other casualties and personnel. Furthermore, early collaboration with regional EOD team is the paramount important (Howell, C. M., *et al*. 2016). Some suggest to considerate amputation of limb even if the injury is not itself a threat to the integrity of the limb if UXO is embedded. However, depending on the circumstances, physicians are advised to

decide the treatment options. In some situation, the patient with embedded UXO may not be treatable despite apparent survivable injuries (Nessen, S. C., *et al*., 2008). In our case, we move patient from frontier to nearest tertiary hospital with stabilization by splint and avoiding unnecessary movements. Furthermore, recognition of the type of ammunition is invaluable to decide the treatment option. Preliminary information about UXO: what it looks like, the nature of the particular hazard associated with them, and other relevant factors are essential (Waqas, A., *et al*., 2012). Some author state that the plain radiographs are generally considered safe with respect to potential inadvertent triggering of the UXO. Moreover, it can easily localize and identify the site and type of UXO (Hawks, L. C. R. 2017). In our case, we successfully removed UXO without catastrophic collateral damage by applying these principles as well as shared decision with patient.

CONCLUSION

Regarding management of a patient with UXO, even though the standard operating procedures and guidelines are present, we have to manage according to the sound clinical judgment depend upon the multiple factors including patient concern as in our case. The active collaboration and resource sharing between clinical staffs and bomb squad personnel is essential to success in the management of a patient with UXO. The flexibility with common senses and familiarity with war related surgery are also keys for better outcomes in this rare and weird problem.

CONSENT

The informed consent was obtained from patient for publication of this case report and corresponding photographs.

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