Valley International Journals
Open Access Journal
New Thinking New Innovation

International Journal Of Medical Science And Clinical Inventions
Volume 3 issue 6 2016 page no. 1921-1923 e-ISSN: 2348-991X p-ISSN: 2454-9576
Available Online At: http://valleyinternational.net/index.php/our-jou/ijmsci

Transthoracic Penetration of Shrapnel to Liver-A Specific War Injury Demanding Awareness for Optimal Management

RW Seneviratne[1]
[1]Department of Surgery, Faculty of Medicine, University of Ruhuna. email ranjanamt@yahoo.com

Abstract: ***Author as a trauma surgeon with Sri Lanka army has treated 21 soldiers during December 1999 to May 2001 at Military Hospital, Palaly, Jaffna who only sustained shrapnel injuries reaching liver substance through lower part of right thorax. Injuries were a result of soldier anticipating enemy with gun pointing forward when shrapnel from above ground blasts enter chest wall through weaker flanks of flak jackets. During ATLS assessment they had insertion of a chest drain to right side performed. This 21 patients qualified for thoracotomy on grounds of initial drainage or ongoing drainage as per ATLS guidelines. The group in study did not have abdominal distension and had only mild right hypochondrial tenderness. Chest X-ray revealed right haemothorax and some shrapnel in the liver substance which was confirmed on abdominal X-Ray.***
Although qualified for thoracotomy these patients underwent exploratory laparotomy first. After control of bleeding and mobilization of liver, diaphragmatic lacerations were repaired and liver lacerations managed with gelfoarm packs and sutures. Three of the patients had large liver lacerations and required damage control surgeries which were successful. Thoracotomy was not required in any.

Understanding of exact mechanism of injury through knowledge of the profession is vital for effective assessment in trauma. Awareness and accurate assessment of described thoraco-abdominal injuries contributed to optimum management with exploratory laparotomy and avoid thoracotomy, a second major operation.

Background and aim:

Occupational injuries can be as diverse and complex as proliferating occupations in the world. Even within an occupation each members role and actions differs at times and fullest possible understanding of a person's activities within the occupation is of vital importance to appreciate mechanism of injury appropriately.

Aim of this article is to describe a specific thoraco-abdominal penetrating war injury, requiring awareness and attention which is not found in literature.

Description

Author as a trauma surgeon with Sri Lanka army has treated 21 soldiers during December 1999 to May 2001 at Military Hospital, Palaly, Jaffna with shrapnel injuries reaching liver substance through lower part of right thorax. Those who had major injuries elsewhere as well as those who underwent thoracotomy and those who had additional non-hepatic intra-abdominal injuries were excluded from the study. These patients underwent Advanced Trauma Life Support assessment on arrival at military hospital and had insertion of a chest drain to right side performed during primary survey .

Five patients had more than1 litre of blood on initial drainage while 16 qualified for thoracotomy

DOI: 10.18535/ijmsci/v3i6.2

with draining over 200 ml per hour for four or more consecutive hours. The group in study did not have abdominal distension and had only mild right hypochondrial tenderness. Chest X-ray performed on adjunct phase revealed right haemothorax and some shrapnel in the liver substance. X-ray abdomen was performed to fully evaluate the region and assess the location of shrapnel. According to ATLS protocol this patients would have undergone Thoracotomy. However Exploratory laparotomy was considered more appropriate. After excluding other injuries superior surface of the liver was accessed after dividing ligaments and liver was mobilized to have access to lacerations. They were irrigated, accessible shrapnel taken out and grossly damaged tissue was removed with finger fracture technique. Pringles maneuver was followed by manual compression and gauze pack compression for a period. Subsequent packing of lacerations with gelfoam controlled bleeding from lacerations in all cases. Three of the patients had large liver lacerations and required damage control surgery with peri hepatic gauze packing to be removed at a second operation 48 hours later after a stint at intensive care unit. All bleeding has ceased by then.

Discussion

Combination of right sided chest and abdominal injury carries a high mortality in the region of 21% mainly due to associated injuries (1,2). Soldiers assume prone position on the ground when under enemy fire. While in this position they slightly raise front end of the body on left elbow and hold the gun pointed in forward direction observing and anticipating enemy attacks. This leaves their right lateral chest exposed skywards which is not protected by armour plates of flack jacket then in use. This makes right lateral surface of the chest vulnerable to shrapnels from mortars which explode above the ground after hitting trees or other tall structures. This shrapnel travel through right lower plural cavity and lung to enter liver substance through diaphragm (3). Path can involve bear area of the liver. This result in bleeding from injured liver, diaphragm, lung and chest wall to appear in the chest tube in volumes fulfilling the ATLS indications for thoracotomy. However thoracotomy is a complex maneuver with higher mortality than a safer exploratory laparotomy particularly in a forward military hospital (3).

Assessment of the patient was with history, clinical examination and X-rays as ultrasound facility was not available in forward military hospitals at the time. Dretremination of trajectory by connecting external markers at the entry wounds and X-ray localized shrapnel helps to predict injuries (3). Sensitivity of plain X-ray in detecting injuries to diaphragm and liver is low without employment of above strategy and USScan even if available does not do much better compared to gold standered tests such as CT and diagnostic endoscopy which are not available in forward military hospitals (2,4,5,6). Understanding of above selection of patients receiving a specific injury while the body is aligned in a particular position by the operating surgeon helped to select exploratory laparotomy over thoracotomy. Asensio et al concluded that penetrating thoraco-abdominal injuries incur high mortality (31%), and the mortality doubles for patients who require combined procedures (59%). Inappropriate surgical sequencing occurred in 32 of 73 (44%) patients undergoing combined procedures. Persistent hypotension, indicating that the wrong cavity was accessed, and misleading chest tube output are the leading pitfalls in thoracoabdominal injury management (7). Decision to perform exploratory laparotomy in above set of patients enables them to receive optimum care thus enjoying the possibility of minimizing mortality and morbidity.

DOI: 10.18535/ijmsci/v3i6.2

Conclusions

Understanding of exact mechanism of injury is vital for effective assessment in trauma. With complex occupational hazards this require specialized knowledge related to occupation. Awareness of described type of thoraco-abdominal penetrating injuries contributed to optimum management with exploratory laparotomy and avoid complex procedure of thoracotomy.

References

1 .Williams M., Carlin A.M., Tyburski J.G., Blocksom J.M., Harvey E.H., Steffes C.P. Predictors of mortality in patients with traumatic diaphragmatic rupture and associated thoracic and/or abdominal injuries. American Surgeon. 2004;70(2):157–162. [PubMed: 15011920]

2.Emily Wilson, David Metcalfe, Kapil Sugand, Arunan Sujenthiran,Thiagarajan Jaiganesha: Delayed recognition of diaphragmatic injury caused by penetrating thoraco-abdominal trauma. Int J Surg Case Rep. 2012; 3(11): 544–547.

3. Ball CG:Current management of penetrating torso trauma: nontherapeutic is not good enough anymore. Can J Surg, Vol. 57, No. 2, April 2014

4. Mintz Y., Easter D.W., Izhar U., Edden Y., Talamini M.A., Rivkind A.I. Minimally invasive procedures for diagnosis of traumatic right diaphragmatic tears: a method for correct diagnosis in selected patients. American Surgeon. 2007;73(4):388–392. [PubMed: 17439035]

5. Leppaniemi A.K. Thoracoscopy in chest trauma: an update. Trauma. 2001;3:111–117.

6. Nicholas J. Governatori , Turandot Saul , Sebastian D. Siadecki , Resa E. Lewiss : Ultrasound in the evaluation of penetrating thoraco-abdominal trauma: a review of the literature.Med Ultrason 2015, Vol. 17, no. 4, 528-534.

7. Asensio JA1, Arroyo H Jr, Veloz W, Forno W, Gambaro E, Roldan GA, Murray J, Velmahos G, Demetriades D :Penetrating thoracoabdominal injuries: ongoing dilemma-which cavity and when? World J Surg. 2002 May; 26(5):539-43.

DOI: 10.18535/ijmsci/v3i6.2