

# 1 Significance of Anatomy in Recognizing Trauma with a Rare 2 Case of Trauma with More than 75 Pellet Injuries

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## 7 **Abstract**

8 Blast and Pellet injuries are a modern nuisance. The increasing use of more destructive  
9 methods of damage infliction are on the rise and especially in more violent parts of the world  
10 are a cause of significant morbidity and mortality. The injuries can range from being simple or  
11 localized to more extensive multi system injuries. As such a proper assessment and proper  
12 management of the pelet injuries is a must and a judicious manner of managing these injuries  
13 should be managed. This Young patient had more than 75 pellet injuries after a blast. A  
14 thorough check up was conducted to look for injuries near vital structures and amazingly all  
15 vital structures were unaffected. The patient was monitored and discharged after a few days.  
16 The article deals with knowing the more important Anatomico surgical concepts involved in  
17 assessment of trauma in various regions of the body.

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19 **Index terms—**

## 20 **1 I. Introduction**

21 s the blast injuries are deliberately devised to inflict maximum damage, these injuries often occur in crowded  
22 places like markets and the range of people effected varies greatly as regards age, sex, number of people injured  
23 .We present a case of an young individual who received more than 75 pellet injuries that were scattered throughout  
24 the body. Most of the pellets were received on the right upper limb with a few in chest, abdomen and pelvis.  
25 The neck fortunately had pellets in safe areas .This was one rare case of trauma in which so many pellets were  
26 received by a single patient. In this patient the vitals were Normal. Neurological examination was normal as  
27 was Orthopaedic examination with evidence of bleeding from multiple sites on the body which was taken care  
28 of during the initial assessment. However there was no serious source of bleeding. Trauma in Kashmir valley  
29 has taken a toll. Many people have died, some have got lifelong disabilities and some are incapacitated. Neck:  
30 The area of the neck is especially Important as this area is unprotected by bone or dense muscular covering.  
31 The most significant neck injuries result from penetrating trauma, blunt neck trauma does occur and can be  
32 particularly difficult to manage because it often involves the airway, the first priority in trauma care. Fatality  
33 rates for penetrating neck trauma range up to 50% for rifle or shotgun blasts.

34 The neck is divided into a number of anatomic triangles. Two large triangles are important in discussing  
35 penetrating neck trauma. Penetrating wounds that enter through the sternocleidomastoid muscle or anterior  
36 triangle carry a high likelihood of significant vascular, airway, or esophageal injury. In contrast, wounds to the  
37 posterior triangle rarely involve the esophagus, airway, or major vascular structures, but, if directed inferiorly,  
38 intrathoracic injury can occur.

39 The boundaries of Anterior triangle of neck Anterior: anterior median line of neck Posterior: anterior border  
40 of sternomastoid Base: base of mandible and a line joining angle of mandible to mastoid process.

41 Apex: manubrium sterni. Zone III : It is the part of the neck above the angle of the mandible. The risk of  
42 injury to the distal carotid artery, salivary glands, and pharynx is greatest in this zone, and exposure can be  
43 particularly difficult.

44 **2 III. Thorax**

45 The life threatening injuries incurred in penetrating trauma are distinctly different from those of blunt injuries.  
46 Penetrating thoracic injuries (e.g., stab wounds, gunshot wounds, and impalement on a foreign body) primarily  
47 injure the peripheral lung, producing both a hemothorax and pneumothorax. More than 80% of all penetrating  
48 chest wounds cause a hemothorax, and nearly all cause a pneumothorax. The Penetrating injuries that enter  
49 or traverse the mediastinum must also be evaluated for potential cardiac, great vessel, or esophageal injury.  
50 Hemodynamically unstable patients with mediastinal entering or traversing wounds should be considered to have  
51 exsanguinating thoracic hemorrhage, pericardial tamponade, or tension pneumothorax.  
52 Hypovolemia from intrathoracic hemorrhage is second only to rib fractures as a sequel of thoracic trauma.  
53 Penetrating injuries resulting in direct cardiac injury and pericardial tamponade can rapidly compromise cardiac  
54 function.

55 **3 IV. The Abdomen**

56 Is the third most commonly injured body region. Abdominal injuries can be particularly challenging, because  
57 it is often difficult to assess intra-abdominal pathology in the multiple-injured victim. Blunt trauma continues  
58 to be the most common mechanism of injury to the abdomen. Abdomen is divided into nine regions by: ? Two  
59 vertical planes: right and left lateral planes.

60 Passing from midinguinal point and crossing tip of ninth costal cartilage (mid-clavicular lines) Stomach: It  
61 lies obliquely in upper and left part of abdomen, occupying epigastric, umbilical and left hypochondriac region.  
62 Most full-thickness gastric injury is due to penetrating trauma. Gastric rupture secondary to blunt trauma is  
63 rare . If vomitus or gastric aspirate is bloody, an injury to the stomach should be suspected. However, it is not  
64 unusual for small amounts of blood to be found in the gastric aspirate, even though laparotomy reveals no grossly  
65 apparent lesion.

66 Duodenum: The position of duodenum:

67 Duodenum lies above the level of umbilicus against L1-3 vertebrae, extending ½ inch to right and 01 inch to  
68 left of median plane. The length of duodenum and its different parts Duodenum is a 10 inch long, curved around  
69 the head of the pancreas in form of C. Approximately three fourths of duodenal injuries result from penetrating  
70 trauma, and one fourth are from blunt injuries. Penetrating injuries are usually readily diagnosed at operation,  
71 but the insidious nature of many blunt duodenal injuries makes the initial diagnosis difficult.

72 In addition to maintaining a high index of suspicion in patients with appropriate injury mechanism, a serum  
73 amylase level should be initially obtained and if elevated, repeated at 6-hour intervals in patients with blunt  
74 abdominal trauma.

75 The radiologic signs of duodenal injury on the initial plain abdominal or upright chest radiograph are subtle,  
76 showing only mild scoliosis, obliteration of the right psoas muscle, or retroperitoneal air that is difficult to  
77 distinguish from the overlying transverse colon.

78 Pancreas: Pancreatic trauma is relatively uncommon, accounting for less than 10% of all abdominal injuries.  
79 Although the pancreas is relatively protected in the retroperitoneum, the increasing frequency of large-caliber,  
80 high-velocity civilian gunshot wounds contribute to an increasing incidence of pancreatic injury. Because the  
81 pancreas is surrounded by major abdominal organs and blood vessels, associated injuries are common. Liver and  
82 biliary tree: Liver. The liver is the most commonly injured organ following penetrating trauma and the second  
83 most commonly injured organ following blunt trauma. Fortunately, the injury is often minor and easily managed.  
84 When the liver is the only organ injured, half the lacerations are nonbleeding and do not require suture. In most  
85 lacerations that are bleeding, the source is within the substance of the liver, and control can be obtained by  
86 direct ligation. With deeper lacerations, bleeding may initially be so significant as to prevent adequate exposure.  
87 Under these conditions, the next maneuver is that of inflow occlusion (Pringle maneuver).

88 Porta Hepatis: It is a deep transverse fissure, 05 cm long, on the inferior surface of right lobe of liver, between  
89 quadrate lobe below and front and caudate lobe above. Through it vessels, nerves and ducts pass to and from liver  
90 Isolated penetrating or blunt injuries to the porta hepatis are uncommon. Unless there are associated injuries  
91 to the aorta and inferior vena cava (which take priority) noted at laparotomy, an immediate Pringle maneuver  
92 frequently allows isolation of the structures in the porta hepatis and determination of whether the injury involves  
93 the portal vein, hepatic arteries, or common bile duct. Repair of vascular injuries takes precedence over biliary  
94 structures. Injuries to the portal vein have a high mortality rate. The portal vein supplies 80% of the total  
95 hepatic blood flow and 50% of the oxygen delivery.

96 Gallbladder: injury to this organ has been reported to occur after both penetrating and blunt trauma.  
97 Cholecystectomy is the procedure of choice for severe contusion, avulsion, or perforating injuries to the  
98 gallbladder.

99 Spleen: The spleen lies obliquely along the long axis of 10th rib. It lies mainly in left hypochondrium but  
100 the posterior end extends into epigastrium. It is directed downwards, forwards and laterally. The spleen is  
101 the most commonly injured intraabdominal organ. Splenic injury must therefore be suspected in any patient  
102 with blunt abdominal trauma, particularly if associated with left lower rib fractures. The diagnosis is often  
103 suspected on physical examination but is generally confirmed by abdominal CT scan or exploratory celiotomy  
104 for hemoperitoneum.

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105 Colon: The colon is second only to the small bowel in frequency of abdominal organs injured from gunshot  
106 wounds, and third (liver, small bowel) following abdominal stab wounds. Gunshot wounds to the abdomen  
107 generally require exploratory laparotomy.

108 Kidneys: Penetrating injury to the kidney may be secondary to a gunshot. Parenchymal injury caused by a  
109 low-velocity weapon is usually not life threatening and is generally easily treated with débridement and primary  
110 repair of the kidney with dependent drainage. Highvelocity bullet wounds are different. Many nephrectomies  
111 and partial nephrectomies are performed in patients with high-velocity penetrating injury because of inability to  
112 control hemorrhage and accurately define the extent of the injury.

## 113 **4 V. Conclusion**

114 It can be safely concluded that the proper knowledge of Anatomy is important for first recognizing the injuries  
115 especially be pellets or blasts. The perfect knowledge of Anatomy is helpful in management as well. As such a  
116 surgeon or a trauma orthopedic surgeon should be well aware of the important anatomic relations in the neck,  
thorax and abdomen.



Figure 1:

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Figure 2: Figure 1 :



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Figure 3: Figure 2 :

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The subdivisions of Anterior triangle  
Submental  
Digastrics  
Carotid and  
Muscular triangle.  
The boundaries of Digastric triangle  
Anteroinferiorly: anterior belly of digastrics  
Posteroinferiorly: posterior belly of digastrics  
stylohyoid.  
Base: base of mandible and a line joining angle of  
mandible to mastoid process.  
Roof : skin  
Superficial fascia: has platysma and cervical branch of  
facial nerve.  
Deep fascia: splits to enclose submandibular gland.  
Floor: mylohyoid, Hyoglossus and Middle constrictor

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Figure 4: