CHOLECYSTORRHAPHY IN THE MANAGEMENT OF MULTI-ORGAN GUN SHOT INJURY OF THE ABDOMEN.

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ABSTRACT

Although, other abdominal organs may be implicated in multiple-organ gunshot injury of the abdomen; the gall-bladder appears to be anatomically protected. We particularize here a case of multiple-organ injury of the abdomen in which the gall-bladder was also involved. The popular concept is cholecystectomy once the gall-bladder is injured. This report highlights the fact that even though there has been no previous reportage on cholecystorrhaphy in the literature. One should not be deterrent in using it in dire circumstances. Again, operation should not be performed by “rote”, otherwise development of the art of surgery falters. However, the decision to act is not a process without intellectual input.

Keywords: Cholecystorrhaphy, Multiple gun-shot injury, Pragmatism, Management, dire circumstances.

1. INTRODUCTION

Multiple-organ gunshot injury of the abdomen is relatively assuming an alarming proportion in both civilian and military casualties1. Although other abdominal organs may be implicated, the gall-bladder appears to be anatomically protected1. The adult Nigerian male is highly exposed to societal malady1,2. He can be defending the community in communal clashes, or be involved in the institution of higher learning cultic activity, electoral violence, suicidal acts or during armed robbery attacks1,2,3.

Significant intra-abdominal injury occurs in about 80% of the time3. Hand gun is the commonest cause of significant penetrating/perforating injury of the abdomen4,5. Most frequently involved organs especially in multiple intra-abdominal gunshot injuries are:

- Liver in 37% of cases
- Small bowel 26%
- Stomach 19%
- Biliary system 1%

However, to the best of the knowledge of the authors, no gunshot injury has involved the gall-bladder4,6. Cholecystectomy and cholecystostomy are well documented operative procedures of the gall-bladder, but to the best of the knowledge of the authors, cholecystorrhaphy has not been documented in the literature4,6,7. This report is therefore to emphasize the need for surgical pragmatism. This becomes necessary in the index
situation, where the rigid steps of “Damage Control Surgery” was skipped for immediate definitive operative intervention as part of resuscitation.

1.1. CASE PRESENTATION:

A.C. is a 24 year old security guard. He claimed to have been attacked by armed robbers while on duty. He presented about 3 hours post injury. He was shot on the abdomen at a close range. The type of gun was not identified. All he noticed were coils of his intestine on the ground, at which the armed robbers also shot before dragging him to the bush. He gathered the mud, stick and grass-ladden-coils of his intestine with his shirt, and clasped same to his chest. His moaning attracted passers-by who brought him to our Accident and Emergency (A/E) unit.

Quick clinical assessment was made. He was conscious, fretful, blood dripping from the trunk to the lower extremities down to the floor. He was pale, blood pressure was 70mmHg systolic and unrecordable diastolic.

Infusion of crystalloids was made to run fast; while blood was taken for urgent investigations viz: PCV (packed cell volume), grouping and cross matching, serum urea and electrolyte, urinalysis and viral screening were also done.

Nasogastric tube and urethral catheter were passed. Tetanus toxoid and prophylaxis, a third generation cephalosporine (ceftriaxone = Rocephin) and metronidazole were all commenced.

On reassessment, positive findings were on the abdomen; where we noted:

- A circular entry wound 10cm below the (R) costal margin. This measured 4 x 4cm in its maximum dimension.
- Exit wound with ragged edges 10 x 8cm at the (L) lumber region with loops of small bowel, ladden with mud, leaves and sticks, eviscerating from the wound with appreciable active bleeding.
- There was generalized tenderness and guarding with rigidity.

With little or nothing to gain in continuing resuscitation outside the main operating theatre, patient was taken in for emergency exploratory laparotomy. At surgery, the findings were:

- The entry wound
- The exit wound with its entrapment and extrapment effects on the retained and eviscerated loops respectively.

• Mud, stick and leaves-ladden multi perforated loops of gangrenous bowel comprising 260cm of ileum and 140cm of jejunum jutting from the exit wounds.
• Haemoperitoneum of about 1.5litres with bilious and faecal soilage.
• 10cm (R) hepatic lobe laceration with ragged edges and a depth of 4cm, bleeding actively.
• Shattered gall-bladder fundus measuring about 5 x 5cm in its maximum dimension.
• Ragged edge laceration of the anterior and posterior walls of the stomach measuring 10 and 12cm respectively.

Procedures include:

- The hepatic wound was packed to arrest bleeding from the liver
- Widening of the exit wound to release the constricting and dragging effects on the bowel and the splanchnics was effected.

Of the 190cm of the ileal segment retained within the peritoneal cavity; proximal 20cm was involved in multiple perforations. We allowed an added 10cm free margin for resection. Thus in addition to the jutted length, resection was effected at 220cm from the ileo-caecal junction; bringing the resected bowel to 200cm, while 160cm remained. Jejunal resection commenced at about 140cm from the ligament of Treitz giving only 4cm free margin to resect at 239cm from the arbitrary ileo-jejunal junction. What remained out of the 150cm of jejunum was just 6cm and part of this got used up in refashioning, preparatory for primary ileo-jejunal anastomosis. Thus effecting primary ileo-jejunal anastomosis with only about 3cm segment of the jejunum.

Immediate hepatic repair was done by approximating the margins with deeply placed sutures (vicryl 1) on a large round bodied needle.

For the gall-bladder lesion, we applied an intuitive conservative refreshning of the edges of the gall-bladder fundal injury, followed by cholecystorrhaphy around a closed drainage tube through a separate stab wound incision. Copious lavage of the peritoneal cavity with warm normal saline, followed immediately by the conventional irrigation with 1g tetracycline in 1 litre of warm normal saline.

Tube drainage of the Mourison’s pouch, and pelvis was carried out via a separate stab wound incision. Debridement of the entry and exit wounds with
dressing was done and mass closure and skin apposition were effected with nylon 2.

1.2. POST-OPERATION:
Post-operative condition was turbulent. This includes haemodynamic instability, non compliance

- (Post Operative Day 5), and he was commenced on fluid diet only for 2 days, before going on graded oral intake. He was however restricted from fatty foods.
- The peritoneal tube drain was removed on POD 7 after commencement of graded oral intake.
- The main wound apposition sutures were removed on POD 7 to continue all wound dressing.
- The cholecystorrhaphy/cholecystostomy tube was removed on POD 32 following 24-hour drainage of < 10ml of bile.
- Bile leakage from the cholecystorrhaphy/cholecystostomy site continued for 10 days and stopped completely on the 17th day post tube removal.
- By now, all the anterior abdominal wall wounds had virtually healed, without further surgical intervention.
- Patient was discharged home 20 days post-tube removal; bringing the total number of hospital stay to 52 days.
- He has done well at 21 months follow-up.

2. LITERATURE REVIEW:
Multi-organ gunshot injury of the abdomen is a global problem6. Gunshot is the commonest human attack in the United States of America, the whole of Africa, Nigeria inclusive9,10.

Afghanistan war of 1985 recorded the highest incidence of gunshot wound (38%) with the highest recorded abdominal injury of 14%6. In Nigeria, gunshot accounted for 57% of penetrating/perforating abdominal injuries with significant mortality of 10%2,11-13. Even so, there has been no documented case of gall-bladder injury as in our present series. In any case, the incidence of involvement of the biliary system in multi-organ injury of the abdomen is just 1%4,6. The gall-bladder involvement in our index case is a clear evidence that our society is ruthlessly researching in crime11. This is heightened by the rising trend of with the prescribed drugs, fluid and electrolyte imbalance and wound infection. However, with dedicated care from the managing Surgeons and the nursing staff, the patient eventually became stable. Patient received a total of 5 units of blood. The following were noted;

- Nasogastric tube was removed on POD armed banditry in Nigeria due to down turn of economy and population explosion11,13. Owerri is a metropolitan city with a domestic airport and teeming public and private enterprises. The city attracts many who come to seek employment which is usually unavailable. The cost of living in this city is high, coupled with poverty and the present day avarice. Thus providing a fertile ground for various antisocial behaviours especially armed robbery as in our index case.

All surgeons treating patients of high velocity (>350m/s) gunshot injuries need a thorough understanding of the mechanisms by which these weapons cause wounds14-17. From the recent concepts, missile wounds are now described in terms of energy transfer, and not velocity which is merely one factor determining energy availability and its transfer to the tissues with its attendant effects.

Intra abdominal missile injury has the highest propensity to be both penetrating and perforating5. The understanding is that bullet fired from handguns and most modern fragment munitions are propelled at a low velocity, and have low available energy, resulting in low energy transfer wounds6. With this, there is a high index of suspicion that this our present case may have been a case of low energy transfer. More so, that he was able to gather the eviscerating viscera unto himself before he was helped to the hospital. Again, there was no friction burns around the entry wound, and the hepatic injury was drilling rather than pulping in nature19.

However, the degree of visceral assault was far more than what low energy transfers can portend. Even so, multi-organ injury of the abdomen from high velocity bullet has a great potential to cause injury remote from the wound track19. This is associated with temporary cavitations and shock-wave effects reminiscent of intra-abdominal organs like the liver and spleen, then bowel and gall-bladder respectively6. This is exactly true of the case at hand: excepting that the spleen was not involved. In any case, rifle bullets of high velocity are aerodynamically unstable and tend to oscillate
around its long axis. This is an important deviation called the angle of yaw. Any irregular movements are rapidly damped by gyroscopic action of the spin. This is not adequate to maintain the stability of the missile in any media that are denser than air - peritoneal cavity as in our index case. A bullet that hits tissue becomes more unstable. Any angle of yaw that is present will be greatly increased, sometimes to the point of tumbling. While the degree of injuries in this patient are in line with high velocity bullet injury; his immediate past injury physiological stability even in the present of continuing significant blood loss still suggests low velocity injury.

Nevertheless, temporary cavitations only occur with high velocity bullets, and are the main reason for their immensely destructive effect. Again, shock wave effect can exhibit a devastating high pressure. This has its destructive effect mostly on hollow organs, like the gall-bladder and the bowel causing damage at a distance, just as the most devastating effect of the temporary cavitations is on solid organs like the liver. These were all in focus in our index case. The foregoing adds to the challenging factors in multi-organ gunshot injury of the abdomen.

Contrary to the common belief, high velocity bullets are not sterilized by the heat of their passage through the air. A bullet can be painted with bacteria. It can be fired through a dot impregnated with bacteria. This is an active process, in Contradistinction with the passive process of contamination of low velocity bullet. The foregoing has buttressed the fact that in both high and low velocity injury contamination and so high propensity to fulminate sepsis abound. This informed our use of high potency broad-spectrum prophylactic antibiotics – 3rd generation cephalosporin’s (ceftriaxone) against gram positives and gram negatives, aerobes and anaerobes. We also added metronidazole against bacteriodes. Clostridia spores are normally carried on the skin and clothing. Most infections resulting from these organisms are autogenous. These were duly taken care of.

The index case was 24 years of age. This is in consonance with documented peak age at risk for gunshot injury which is usually between 21-30 years of age. This is the most dynamic age group. The patient arrived the hospital 3 hours post injury. By the Nigerian standard, this is impressively ultra short, and in discordance with the experience of other workers in Nigeria. The early presentation may be attributed to recent increased awareness. Courtesy of the Emergency Response Programme recently launched by Imo State Government. Following a similar trend, we intuitively skipped the expected Damage Control Surgery (DCS) (staged-approach to salvage life after major trauma) for a definitive operative intervention as part of resuscitation. This approach had to be opted for anyway. Intrapertoneal bleeding was obvious; hence chances of arresting haemorrhage outside surgical intervention were out. There was no functioning ICU (Intensive Care Unit) to contemplate on the possibility of restoring normal physiological parameters before surgery. Our practical and useful concern here was to categorize injuries into penetrating/perforating and non-penetrating/non-perforating as this correlates more with the likelihood of significant intra-abdominal injury. Thus the injury Severity Score (ISS) and the Penetrating Abdominal Trauma Index (PATI) could not be calculated. Moreover, we did not want to suffer what Scalea and Maull described as “the nemesis of the trauma surgeon” (missing of injury at the initial operation).

The gross contamination of the peritoneal cavity, though intimidating was the least of our problems, since prophylactic antibiotic therapy was already in place. Fortunately the usual drilling rather than pulping hepatic injury was our finding. Thus informing us to dare primary hepatic repair. In principle a ruptured gall-bladder is best treated by cholecystectomy. However, the situation here was peculiar and had to be peculiarly handled. This gall-bladder was torn at the fundus in sizable shreds of three. We pragmatically dissected out the remnant on the hepatic bed. Conservatively, we refresheden and repaired around size 18FG retaining Foley’s Catheter. This was brought out via a separate stab wound. We did this to rest the gall-bladder as would be the case after the repair of other hollow organs, for example, the urinary bladder. Most importantly, we had to allay our fears of bile peritonitis (Waltman-Walters syndrome). The strongest force that led to cholecystorrhapsy was basically the volume of surgical manoeuvre yet to be carried out on this patient who the Anaesthetist continued reporting “no pulse, no blood pressure”. However, the surgeon was spurred on by the presence of the aortic pulse. The infusions and transfusions continued in a titrated manner.
Again, we adjudged that the tissue loss on the gall-bladder was not extensive. There was no complete loss of the fundus. The body, Hartmann’s pouch and cystic duct were all intact. The feasibility of cholecystectomy was more than hazardous. This was because most of the organs e.g. stomachs, small bowel, liver to be retracted/manoeuvered were all significantly involved in the trauma. The gastric bivalving was more or less a felix culpa (happy fault). Since the absolutely indicated dissection into the lesser sac was behind. More than 100cm (critical length) of the proximal ileum were left behind. There was therefore no fear of significant nutritional problems. More so, the distal ileum was left intact.

3. CONCLUSION

The problem of short bowel syndrome did not arise, since what matters is the bowel length left behind. More than 100cm (critical length) of the small bowel was left behind. There was therefore no fear of significant nutritional problems. More so, that the distal ileum was left intact. Despite the severity of trauma in this patient, there was no multiple organ dysfunction syndrome (MODS). However, Systemic inflammatory Response Syndromes (SIRS) as evidenced by spikes of temperature, vomiting, malaise were troublesome challenges. These were effectively addressed.

4. RECOMMENDATIONS

The gun is the commonest weapon for armed banditry and other antisocial activities. Government should have the political will to ban all forms of illegal possession of firearms. This report is to highlight the fact that although not yet documented: cholecystorrhaphy has to be kept in mind as a possible, practicable and narrow way out when tightly challenged with gunshot injury cases.

REFERENCES


