



Surgical Management of Severe Abdominal Trauma Patients in the Surgical Department of the Toamasina CHU, Madagascar

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Abstract

Severe abdominal trauma represents an absolute surgical emergency. The objective of our study is to report the surgical management of severe abdominal trauma in a low-resource center. This was a 31-month observational study from January 2018 to August 2020. We have 44 cases of severe abdominal trauma. The sex ratio was 4.5. The mean age of patients with severe abdominal trauma was 31.43182 years. A penetrating wound to the abdomen was seen in 68.18%. The circumstance of the trauma was a liability accident in 70.45%. A shortened laparotomy was performed. The mean duration of the operation was 45.63636 minutes. No perioperative death was reported during the performance of the shortened laparotomy. Controlling emergency surgery improves the vital prognosis of polytrauma patients.

Introduction

Nearly 10% of deaths worldwide are of traumatic origin, of which 30 to 40% are related to hemorrhage, which makes hemorrhagic shock the second leading cause of death after head trauma (Kauvar & Wade, 2005). The therapeutic strategy is based on a comprehensive multidisciplinary approach to hemorrhagic shock. Centered on pre-, per- and post-operative resuscitation, it incorporates a rescue surgical strategy, in its minimalist essence, derived from wartime experience (Burch et al., 1992a). Faced with a dying patient whose hemorrhagic shock seems apparently uncontrollable, the objective is to restore normal physiology rather than anatomy (Burch et al., 1992b). For the most dramatic cases, it is recommended to perform an abbreviated laparotomy (LAPEC) or abbreviated laparotomy (Le Noël et al., 2011). The interest of our study is to establish data from patients with severe abdominal trauma who underwent abridged laparotomy in our establishment. Our study aims to postpone the surgical management of patients with severe abdominal trauma in a center with limited resources.

Methods

It was a 31-month observational study from January 2018 to August 2020, carried out in the surgery department of the Analankininina Toamasina University Hospital Center. The study populations were patients with severe abdominal trauma. We included all patients operated by an emergency abridged laparotomy who were victims of severe abdominal trauma, polytraumatized or not, with a state of hypovolemic shock and a syndrome of visceral failure. The parameters studied were: age, gender, context and circumstance of trauma, type of

abdominal trauma, injuring agent, duration of intervention, lesions seen intraoperatively and the rescue gesture performed.

Results and Discussion

Table 1. Result According To The Intra-Abdominal Lesion

Intra-abdominal lesion	Effective (n=44)	Percentage (100%)
Perforation of the small intestine	15	34,09
gastric perforation	5	11,36
Colonic perforation	2	4,55
Mesocolon wound	2	4,55
Contusion and splenic wound	6	13,64
Liver injury	5	11,36
Diaphragmatic wound	1	2,27
mesenteric wound	3	6,82
No lesion	5	11,36

Intra-abdominal lesions were bowel perforation (ileal or jejunal) in 34.09% (n=15), gastric perforation in 11.36% (n=5), colonic perforation in 4.55% (n=2), a lesion of the transverse mesocolon in 4.55% (n=2), a splenic contusion in 13.64% (n=6), a liver injury in 11.36% (n=5), a diaphragmatic wound in 2.27% (n=1), mesentery wound in 6.82% (n=3) and no lesion in 11.36% (n=5).

Table 2. Distribution According To The Surgical Procedures Performed

Operative acts	effective (n=44)	Percentage (100%)
Ileorrhaphy and jejunorrhaphy	15	34,09
Total splenectomy	6	13,64
Colonic suture	2	4,55
A hemostatic suture of the mesocolon wound	2	4,55
Gastrorrhaphy	5	11,36
Diaphragmatic suture	1	2,27
mesenteric suture	3	6,82
packing perihepatic	5	11,36
none	5	11,36

The procedures performed were numerous: ileorrhaphy or jejunorrhaphy in 34.09% (n=15), total splenectomy in 13.64% (n=6), simple suture of the colon in 4.55% (n=2) of cases (n=2), Hemostatic suture of the mesocolon wound 4.55% (n=2), gastrorrhaphy in 11.36% of cases (n=5), diaphragmatic suture in 2.27% of the cases (n=1), a simple suture of the mesenteric wound in 6.82% (n=3), a perihepatic packing by an abdominal field in 11.36% of the cases (n=5), and no procedure performed in 11.36% (n=5).

We had collected 44 cases that responded favorably to our criteria. The sex ratio was 4.5. The male gender was 81.82% (n=36) and the female gender 18.18% (n=8). The average age of abdominal trauma patients was 31.43182 years [95% CI: 27.10064-35.763] with extremes ranging from 7 years to 86 years. Regarding the type of abdominal trauma: 30 (68.18%) patients had a penetrating wound of the abdomen against 14 (31.82%) patients who had an abdominal contusion. The circumstance of the trauma was a civil liability accident in 70.45% (n=31) and a public road accident in 29.55% (n=13). The injuring object was a knife in 31.82%

(n=14), a direct blow to the abdomen in 50% (n=22), a firearm in 11.36% (n=5) and zebu goring in 6.82% (n=3). We had urgently performed a shortened laparotomy on all our patients. At the coeliotomy, all the patients had a lot of hemoperitoneum in common. Involvement of several organs was found in 22.73% (n=10), and a uni-focal lesion in 72.73% (n=32). All patients had systematically benefited from peritoneal lavage and drainage by siphoning during the operation (n=44). The average duration of the procedure is 45.63636 minutes [95% CI: 42.47947 – 48.79325]. No perioperative deaths were reported during the damage control. Reoperation was done after 48 hours to remove the abdominal field in 15.91% (n=7) of patients who had benefited from hepatic packing.

Abdominal trauma is the prerogative of the male gender (Choua et al., 2017). This was observed in our study with a sex ratio of 4.5, matching the data in the literature (Fanomezantsoa et al., 2015a).

Young people of working age were the most affected, with an average age of 31.43182 years. Our result is similar to that of Rahehinantenaina and Rakotoarivony with an age average of 30.4 years and 29 years (Fanomezantsoa et al., 2015; Rakoto et al., 2008). Some authors have a result close to our series which revolves around 27 to 36 years (Monneuse et al., 2004; Ayite et al., 1996). At this age, the tendency is towards recklessness, with a marked propensity for violence and adrenaline-inducing activities, including speeding, contact sports, etc. In our context, young men are the main users of motorcycles, the machines most involved in road accidents (Choua et al., 2014). The causes are: exponential increase in the number of cars and motorcycles in emerging countries, non-compliance with basic road safety standards. In addition, the state of the roads, their nocturnal illumination, and the crowding between various types of motorized vehicles, or animals and pedestrians, increase exposure to accidents (Ngaroua et al., 2016a).

The penetrating wound of the abdomen was the first cause of serious abdominal trauma in our series. This is due to the severity of the injuries caused by sharp objects, and the affected organ. The most common cause of death for patients who die early after severe trauma is haemorrhage (>80% of cases). The location of the lesion considered to be the cause of death is the abdomen in 53% of cases (Kreis et al., 1986).

The context of the trauma most often was an assault with civil liability in 70.45%. Rahehinantenaina (Fanomezantsoa et al., 2015b) found that 79.3% of patients are victims of aggression with civil liability. Etiologies vary from country to country depending on economic, cultural and socio-political contexts (Fanomezantsoa et al., 2015c).

In France, the majority of severe abdominal trauma occurs during road accidents [10]. Road injuries are responsible for 1.2 million deaths worldwide each year. According to the literature, 90% of road accident deaths in the world occur among injured people living in low- and middle-income countries (Ngaroua et al., 2016b).

In our series, the bladed weapon was the first vulnerating agent of penetrating trauma to the abdomen. This is due to very high insecurity in our city, and criminals obtain it more easily at a lower cost (Thomson et al., 1996a). Found a high use of bladed weapons in Africa which are frequently responsible for penetrating wounds in the abdomen (Thomson et al., 1996b).

A rapidly onset state of shock is a sign of uncontrolled bleeding, the main causes of which are hepatic or splenic damage or damage to the abdominal vessels (Burch et al., 1992c).

Often the involvement of solid organs (spleen or liver) was very hemorrhagic, patients arrived late in the emergency room due to the lack of means of transport. This caused a delay in support. Vascular damage to the mesocolon or mesentery can be the cause of significant bleeding, indicating an urgent exploratory laparotomy. Given the unstable state of the patients or the association with extra-abdominal lesions, the operative time must be shortened (Ridereau et

al., 2008).

The criteria for performing an abbreviated laparotomy are based on the pH value, the temperature value, the existence of a state of shock, the number of red blood cells transfused, intraoperative blood loss, plasma lactate concentration and/or the presence of coagulopathy (Asensio et al., 2001). Various thresholds are described in the literature without it being possible to assert that one threshold is superior to the other. The following criteria, proposed in a review of the literature, can be used: presence of a pre- or per-operative post-traumatic hemorrhagic shock, accompanied by metabolic acidosis ($\text{pH} < 7.2$), hypothermia (temperature $< 34^{\circ}\text{C}$) and/or coagulopathy (Roberts et al., 2016).

The average duration of the intervention was 45.63636 minutes. This was the time needed to perform the life-saving gestures on a patient with polytrauma or not, but often hemodynamically unstable. Surgical control of hemorrhage and digestive contamination takes precedence over anatomical repair and must be obtained as quickly as possible in order to shorten the laparotomy (Thomson et al., 1996c).

The gesture performed during the shortened laparotomy is very limited given the often catastrophic state of our patients. To control the elementary lesion as quickly as possible, we use a simple suture without resection anastomosis (ileorrhaphy, jejunorrhaphy, gastrorrhaphy), (Shapiro et al., 2000). The most important thing is to close the colonic or small bowel breach to avoid contamination of the peritoneal cavity. Stitch ligation of the vessels is necessary in bleeding mesocolon or mesenteric wounds (Deitch & Goodman, 1999).

Sometimes certain contexts oblige us to immediately control the bleeding by carrying out perihepatic packing during serious hepatic wounds or contusions because attempts at hemostasis can cost the patient's life (Létoublon & Arvieux, 2003). Rapid peritoneal drainage washing is formally recommended after the operation to control basic lesions. Abbreviated laparotomy is a very effective technique that significantly reduces the mortality of unstable patients (Voiglio et al., 2016).

The consensus attitude is to consider reoperation only when Moore's lethal triad is under control (hypothermia, metabolic acidosis, coagulopathy) (Moore, 1996). In the absence of abdominal compartment syndrome, the packs should be left in place for 24 to 48 hours, except in the case of massive initial contamination which greatly increases the incidence of abscesses (Rossaint et al., 2010). Waiting more than 72 hours, however, seems to expose more to mortality and morbidity, in particular infectious. The reoperation has two objectives: the definitive repair of the organs and the closure of the fascias. Digestive continuity is re-established, a stoma placed if necessary, and solid organs possibly recovered (Miller et al., 2007).

Conclusion

The abdominal trauma is serious and life-threatening for our patient. Penetrating wounds during a civil liability attack by stab or firearm are very numerous, providers of fatal lesions, which allow the indication of a shortened laparotomy, without forgetting also the violent trauma caused by a traffic accident. Perfect mastery of this concept and of the operative technique linked to abridged laparotomy can modify the vital prognosis of patients who have suffered serious abdominal trauma or polytrauma with abdominal involvement. We encourage practitioners to carefully consider the application of an abbreviated laparotomy.

References

Asensio, J. A., McDuffie, L., Petrone, P., Roldán, G., Forno, W., Gambaro, E., ... & Chan, L. (2001). Reliable variables in the exsanguinated patient which indicate damage control and predict outcome. *The American journal of surgery*, 182(6), 743-751.

- Ayite, A., Etey, K., Feteke, L., Dossim, M., Tchatagba, K., Senah, K., ... & James, K. (1996). Les plaies pénétrantes de l'abdomen au chu de lomé-a propos de 44 cas. *Médecine d'Afrique noire*, 43(12), 642-646.
- Burch, J. M., Ortiz, V. B., Richardson, R. J., Martin, R. R., Mattox, K. L., & Jordan Jr, G. L. (1992). Abbreviated laparotomy and planned reoperation for critically injured patients. *Annals of surgery*, 215(5), 476.
- Choua, O., Rimtebaye, K., Yamingue, N., Moussa, K., & Kaboro, M. (2017). Aspects des traumatismes fermés de l'abdomen opérés à l'Hôpital Général de Référence Nationale de N'Djaména (HGRN), Tchad: à propos de 49 cas. *The Pan African Medical Journal*, 26.
- Choua, O., Zounvournai, A., & Sidi, S. K. (2014). Accidents de motos à N'Djaména: plaidoyer pour le port de casque. *Ann Univ Abd Moum*, 25, 26-33.
- Deitch, E. A., & Goodman, E. R. (1999). Prevention of multiple organ failure. *Surgical Clinics of North America*, 79(6), 1471-1488.
- Fanomezantsoa, R., Davidà, R. S., Tianarivelo, R., Fabienne, R. L., Aina, R. T. M., Auberlin, R. F., ... & Nirina, R. R. H. (2015). Traumatismes fermés et pénétrants de l'abdomen: analyse rétrospective sur 175 cas et revue de la littérature. *Pan African Medical Journal*, 20(1).
- Kauvar, D. S., & Wade, C. E. (2005). The epidemiology and modern management of traumatic hemorrhage: US and international perspectives. *Critical Care*, 9(5), 1-9.
- Kreis Jr, D. J., PLASENCIA, G., Augenstein, D., Davis, J. H., Echenique, M., Vopal, J., ... & Gomez, G. (1986). Preventable trauma deaths: Bade county, Florida. *Journal of Trauma and Acute Care Surgery*, 26(7), 649-652.
- Le Noël, A., Mérat, S., Ausset, S., De Rudnicki, S., & Mion, G. (2011, September). Le concept de damage control resuscitation. In *Annales françaises d'anesthésie et de réanimation* (Vol. 30, No. 9, pp. 665-678). Elsevier Masson.
- Létoublon, C., & Arvieux, C. (2003). Traumatismes fermés du foie. Principes de technique et de tactique chirurgicale. *Encycl Méd Chir*.
- Miller, P. R., Chang, M. C., Hoth, J. J., Holmes IV, J. H., & Meredith, J. W. (2007). Colonic resection in the setting of damage control laparotomy: is delayed anastomosis safe?. *The American surgeon*, 73(6), 606-609.