than an added volume of shed blood and thus its complicating influence on an already established coagulopathy, seems to be a more reasonable approach. Results from this review support such a contention.

Timing of the delayed laparotomy must be based upon documentation of a once-again effective clotting mechanism. This decision for reoperation should be made upon observation that blood will actually clot, because a bleeding diathesis still may persist despite normal values for coagulation components. Contrariwise, although the same components may be deficient, blood may indeed clot.[3]

Because of problems with subsequent development of intestinal fistulas, it has been preferred at second laparotomy to oversew the distal bowel and to create an end stoma for the most proximal line of intestinal transection. Then, anastomosis can be done beyond that point, because protection has been afforded by complete intestinal diversion.

Likewise, because of the predictably high rate of wound infection, delayed primary closure of the skin and subcutaneous tissues is the better choice.

During the interval between aborted laparotomy and second exploration, significant increases in intraabdominal pressure due to packing create major difficulties with ventilation. Accordingly, a positive airway pressure must be maintained at times with an end-expiratory pressure often exceeding 30 cmH_2O. The latter routinely complicates venous return to the heart, and thus demands that both ventilatory as well as cardiac dynamics be monitored carefully.

References

1. Fabian TC, Stone HH. Arrest of severe liver hemorrhage by an omental pack. South Med J 1980; 73:1487–1490.
2. Feliciano DV, Mattox KL, Jordan GL Jr. Intra-abdominal packing for control of hepatic hemorrhage: a reappraisal. J Trauma 1981; 21:285–289.
3. Harrigan C, Lucas CE, Ledgerwood AM, Mammen EF. Primary hemostasis after massive transfusion for injury. Am Surg 1982; 48:393–396.
4. Richards AJ Jr, Lamis PA Jr, Rogers JT Jr, Bradham GB. Laceration of abdominal aorta and study of intact abdominal wall as tamponade: report of survival and literature review. Ann Surg 1966; 164:321–324.

Discussion

DR. JOSEPH S. MCLAUGHLIN (Baltimore, Maryland): Those of us who do thoracic and cardiac surgery have encountered this phenomenon on many occasions. One sees this following trauma, occasionally with pulmonary resections and most often following cardiopulmonary bypass. If one places pressure on the area which is bleeding, and maintains this pressure for a few minutes, the bleeding stops. The problem is that once pressure is released, in a few minutes the clots lyse and the bleeding once again becomes uncontrollable.

Most of us around the country have adopted a similar methodology to control this situation. Chest tubes are inserted in the usual manner, because we can't pack the pericardial sac, the incision is closed, and the patient is placed on PEEP. PEEP acts as an internal tamponade, increasing the pressure in the chest to the point where small capillary oozing stops. Fresh frozen plasma, platelets, and—at times—Amicar are administered to control the coagulopathy.

It occurred to me that in many of Dr. Stone's patients there were situations where no further operative procedure would necessarily need to be carried out. Further, many patients who come into our emergency rooms are treated by MAST trousers because of uncontrollable bleeding. These external trousers are placed on persons, especially those with pelvic fractures, and are highly effective in tamponading by external pressure. I wondered whether or not the same sort of system could be utilized in the patients that Dr. Stone described—specifically, those patients who do not require further operative procedures.

DR. PAUL H. JORDAN, JR. (Houston, Texas): Harlan, I presume that the cases you reoperated on did not have the coagulopathy again. All you did was give them platelets and fresh-frozen plasma.

The question I have is: What should we do to avoid getting into this situation in the first place? What is the key there?

DR. H. HARLAN STONE (Closing discussion): Insofar as the MAST trousers are concerned, they do offer another modality for controlling the hemorrhage. Nevertheless, we still would need to reoperate on the patient to remove clot, which otherwise would become infected. We have preferred to use the pack. It is not by any means new; it has been used for quite a long time. Several patients have been referred from other parts of Georgia, and one knew immediately that the referring surgeons were a bit worried because of the obvious packs protruding from the abdomen. MAST trousers might offer an alternative approach.

With respect to Dr. Jordan's question, how to avoid all of this, I really do not know the answer. There has been some attempt at legislation for gun control, but I believe that education of the population and the acquisition of more humane values are the only final solutions.