

## EXPERIENCES OF RIOT SURGERY

### A REVIEW OF 50 CASES

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THIS paper is an attempt at evaluating the results of established methods of treatment and new techniques of management of some 50 casualties resulting from the recent communal riots in Calcutta.

The casualties could be divided into the following categories :—

1. Abdominal stabs and gunshot wounds 12.
2. Stab wounds of the thorax 15.
3. Stab wounds involving soft tissue only 13.
4. Gunshot wounds of the extremities including compound fractures 10.

#### *Abdominal stabs and gunshot wounds*

These take the pride of place not only because of their frequency in this riot but also because they need the greatest attention and have the highest mortality.

Every case of abdominal stab or gunshot wound requires exploration however trivial the superficial wound may appear to be. This fact is well recognized and requires no emphasis, were it not for the fact that the extremely minor nature of the parietal wound often deludes the surgeon.

*Example.*—A small boy was admitted with a stab wound in the left lumbar region just below the costal arch. The wound was minute, and the child was in good condition with a slow pulse rate. The abdomen was soft. There was little tenderness, there was no fluid in the peritoneal cavity and peristalsis was active. The child had passed clear urine. The child was watched for 24 hours. On the second day his condition worsened and he complained of pain and increased tenderness in the left renal angle. Laparotomy disclosed subcapsular hæmatoma of the spleen. Splenectomy was performed.

The site and direction of the stab wound is a good indication of the structures likely to have been injured. A good illustration of this was in the man who was struck obliquely in the right loin and sustained laceration of the right lobe of the liver, perforation of the pyloric end of the stomach, first part of the duodenum and the adjoining portion of the transverse colon.

Gunshot wounds of the abdomen, however, have precarious pathways and often-times surprise the most painstaking surgeon.

*When to operate.*—It is a mistake to operate on any case of stab wound of the abdomen until the patient has been well resuscitated. I have heard it being expressed that if you cannot operate on these cases within the first 3 hours, the prognosis is almost hopeless. I have also noted the opinion of surgeons who say that shock for some reasons is conspicuously absent in these cases in the first few hours (Som and Mukherjee,

1947). In my experience this is a dangerous teaching. I find that shock in these cases is most profound within the first 2 to 3 hours and that unless the patient is in a reasonable condition to withstand what may be a major operation, it is a mistake to operate on them straightaway. The exception of course is in those cases where hæmorrhage is suspected. My practice is to insist on a well-regimented course of resuscitation and not to operate on any case until the systolic pressure has risen up to 100 mm. and diastolic to 60 mm. Hg.

*Incision.*—Routine use of paramedian incision is to be deprecated. There is a good deal to be said for the use of oblique and transverse incisions in selected cases. Exposure is much improved. Manipulation is easier, the general peritoneal cavity can often be left undisturbed and closure of the abdomen is less difficult.

*Example.*—A man received a stab wound of the right flank, the direction being downwards and inwards. The abdomen was opened by a transverse muscle cutting incision. It revealed lacerated injury of the right lobe of the liver and hepatic flexure of colon. Repair was easy. Two points need be stressed (1) that the general exploration of the abdomen, if necessary, can be well accomplished by the incision, and (2) that the resulting sear is quite sound.

If the wound of entry is somewhere in the back posterior to the mid-axillary line, it is a good practice to attend to this first and afterwards turn the patient on his back and proceed with the abdominal exploration. The advantages of this procedure are that (1) it causes less shock and that (2) surgeons are otherwise liable to forget about posterior wounds at the end of an exhaustive abdominal operation.

Another sound procedure and one which occasionally saves much unnecessary work and time is to investigate all the abdominal structures carefully and make a survey of all the lesions first before commencing actual repair. Very often multiple lesions are present in nearby segments of the bowel and after a time-consuming repair of a perforation, the surgeon is faced with a non-viable nearby segment when both could be included in a single resection anastomosis. Similarly injuries to solid viscera sometimes escape notice when they are associated with hollow visceral injuries. My own practice is to examine the solid viscera first after opening the abdomen, to pack any sources of bleeding found and then to investigate the hollow viscera from stomach downwards and their mesenteries. If more than one lesion exist in the hollow viscera, I close them up temporarily with gauze cover held in place by Allis's forceps until they are taken in turn for repair. This avoids unnecessary spillage and also forms useful guide for the surgeon especially when he is in a hurry.

*Dealing with the actual lesion: Small intestine.*—It is generally recognized that repair

is always better than excision. Three facts need stressing :—

1. There is little danger of narrowing of the lumen and stenosis after repair. Even if the wound in the small gut involves two-thirds of the wall, repair is still to be preferred.

2. If there are two or more wounds in closely contiguous areas of small bowel, it may be feasible to join them and repair them together instead of separately (Turner, 1943).

3. Excision of the small intestine has a much higher mortality than repair.

The indications of excision of small intestine are :—

1. Crushing of the gut wall so as to make it non-viable.

2. Loss of blood supply due to considerable separation of the mesentery from the gut wall. In the present series of cases excision and anastomosis were necessary only in one case (2 per cent) and the man recovered.

*Large intestine.*—The advantage of exteriorization over repair and closure of the large gut lesions have been widely stressed in the last war. Over the mobile areas of the colon exteriorization is easy and less time-consuming. Over the fixed areas it may not always be possible and in such cases repair should be accompanied by local drainage and proximal colostomy.

The indications of excision in large gut lesions are practically the same as those in small intestine except that as the large gut stands exteriorization well, the need for excision arises less frequently. When it does arise however, immediate suture and anastomosis are to be deprecated as mortality from this procedure is high. The operation described by Paul Miculicz under such circumstances is a safer plan to follow.

#### *Thoracic stab wounds*

All cases of thoracic stab wounds treated during the riots have recovered. This is quite remarkable when contrasted with gunshot wounds of thorax (which were unaccountably absent in this series) in which mortality is said to be quite high. All these thoracic stab wounds were associated with extensive surgical emphysema and hæmothorax to a greater or lesser extent. Surgical shock was not a major factor, in fact its absence to any marked extent was remarkable. Only one case with open pneumothorax required resuscitation and he quickly recovered after the pneumothorax was closed. All cases of hæmothorax were aspirated as a routine, some requiring 2 to 3 aspirations. Average amount of blood aspirated was about 15 oz. Intrapleural instillation of penicillin was done at the time followed by routine parenteral penicillin.

I consider that routine use of intrapleural penicillin is a great advance in the treatment of thoracic injuries and explains much of the good results obtained.

#### *Stab wounds involving soft tissues*

These have been treated on orthodox lines and have not caused much difficulty. Primary excision or débridement followed by sulfanilamide dusting has been the usual method. I have preferred to leave the wounds open except in special areas such as the hand or the face. One remarkable case in which the right hand was literally bisected into two by a cut through the whole thickness of the palm between the middle and ring fingers and reaching up to the thenar and hypothenar muscles but somehow sparing the tendons and nerves made a perfect recovery with primary healing.

There was one case of nerve injury involving the ulnar nerve about the middle of the forearm, which was sutured about three weeks after the injury together with anterior transposition.

There were also a few cases of tendon injury involving the flexors and extensors of the fingers which were treated by secondary suture.

#### *Gunshot wounds of the extremities including compound fractures*

These have been treated on conservative lines, care being taken in the primary excision to save as many pieces of loose bones as possible. I have preferred skeletal traction to immediate plastering especially in the case of the femur. One case is worth recording. This was a man who had been shot at close quarters and had sustained an extensive lacerated wound in his right arm involving an area of five inches long with compound comminuted fracture of the humerus. The fractured area in the humerus involved its middle  $\frac{1}{3}$  and there were many loose pieces of bones. There was also complete avulsion of the musculospiral nerve. Kirschner wire traction through the olecranon after primary excision of the wound caused rapid healing of the wound and after one month the arm was put in plaster according to Böhler's method. As it was impossible to suture the musculospiral nerve, tendon transplantation using the flexor tendons of the forearm was performed after six weeks and the man now has a remarkably efficient limb with a soundly united humerus and 80 per cent power of extension of the wrist joint restored.

#### *Summary*

1. This paper is based on the experiences of the recent riot casualties in Calcutta.

2. A few salient points in the management of abdominal stab and gunshot wounds have been mentioned.

3. Thoracic stab wounds have been remarkable for the absence of marked surgical shock and for rapid recovery. Routine use of penicillin is responsible for the latter.

4. Soft tissue injuries and gunshot wounds of extremities have been treated on usual lines. Skeletal traction is preferred to plaster fixation in the treatment of compound fractures.

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TRAUMATIC ARTERIAL SPASM

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Introduction

THAT the arteries undergo spasmodic contraction, when subjected to trauma or concussional violence, is now a well-recognized fact. Called by the French surgeons 'Stupeur Arteriale' and by the German surgeons 'Kroh's Arterial Spasm', the phenomenon was described by Makins (1919) towards the end of World War I. During World War II, several remarkable instances of the condition were cited from diverse theatres of war.

In a series of 567 cases of battle casualties treated in an Indian general hospital, the phenomenon was observed in twenty-seven cases or roughly in 5 per cent of the cases. Actual incidence may be higher as by the time these casualties arrived at the hospital, some of the milder forms of the arterial spasm had already subsided.

Blood vessels in which the phenomenon was noted

Axillary artery	..	..	..	3
Brachial artery	..	..	..	8
External iliac artery	..	..	..	1
Femoral artery	..	..	..	4
Popliteal artery	..	..	..	5
Posterior tibial artery	..	..	..	6
				—
		TOTAL	..	27

Causative factors

Gunshot wounds	..	..	..	15
Shell wounds	..	..	..	4
Bomb wounds	..	..	..	4
Non-missile compound fractures	..	..	..	2
Application of tourniquets	..	..	..	2
				—
		TOTAL	..	27

Description of the phenomenon in the present series of cases

The affected segment of the artery, together with a portion above and below it, was usually found to be empty and firmly contracted. In extreme cases, the reduction in the calibre reached as much as one-sixth of the normal circumference. The branches or collaterals arising from the affected part shared the same fate. The radial or the posterior tibial pulsation was

obliterated. The hand or the foot was pale and cold.

This phenomenon of segmentary contraction was noted more frequently in the brachial than in the axillary, more in the femoral than in the external iliac and more in the posterior tibial than in the popliteal, as will be evident from the incidences in the respective vessels as stated above. In other words, the medium and small-sized vessels of the extremities were more often affected than the large vessels at the roots of extremities. Rene Leriche observed the same incidence.

In one case of gunshot wound through the right arm, two inches above the bend of the elbow, the brachial artery was perforated. But there was no extravasated blood in the tissues outside the blood vessel. Sir George Makins observed quite a number of similar instances in World War I.

In seven cases (five gunshot wounds, one shell wound and one bomb wound) or in one-fourth of the total cases, the high-velocity projectile perforated or penetrated the tissues about 1½ inches to ½ inch from the main artery. There was no naked-eye structural damage of the vessel yet the latter exhibited segmental contraction. Evidently concussional violence reacted on the vessel wall. In sixteen cases, the vessel was contused, lacerated, ruptured or perforated.

Regarding the two non-missile compound fractures, the popliteal artery was contused by the jagged margins of the lower fragment of femur in one case, while in the other, the posterior tibial artery was found to have been pierced and kept tethered over a projecting spike-like process of the lower tibial fragment. Both the vessels were thrombosed at the site of injury, besides being contracted.

Regarding the two tourniquet cases, both were received from the field ambulances with notes stating that owing to uncontrollable hæmorrhages in the palm and in the calf following shell wounds, tourniquets had been applied in the lower part of the arm and thigh. Both were received within an hour of the application of the tourniquets. Apparently they had been applied very tightly, as their release left furrows ¼ inch deep in the soft tissues. Neither the release of tourniquets nor rapid infusion of plasma helped in the return of the circulation of the limb. At operation, the lower fourth of the brachial artery and lower fifth of the femoral artery were found to be extremely contracted. As soon as the vessels concerned were lifted from their beds, in the twinkling of the eye the circulation restarted.

Treatment adopted

A. For those cases where concussional violence set up the phenomenon : exposure of the artery, hot saline packing, lifting the artery from its bed or removal of surrounding areolar tissue— one of these measures or a combination of all