

A FOUR-YEAR SURVEY OF PENETRATING WOUNDS OF THE NECK*

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The frequency of penetrating wounds of the neck has prompted a retrospective survey of the cases admitted to Livingstone Hospital during the 4-year period from January 1964 to December 1967. During this period our policy was to admit all patients with penetrating neck wounds to the ward, apart from those with obviously superficial injuries.

During the period of the survey 117 bodies were admitted to the Government Mortuary in Port Elizabeth with penetrating wounds of the neck involving vital structures. Included in this number are 9 patients who died at Livingstone Hospital following treatment for their injury.

To illustrate the severity of this type of injury graphically from our figures, it can be stated that approximately 30% of victims of this type of assault die before reaching hospital, 3% die despite treatment, and 67% recover after hospitalization. The severity of this type of injury is due to the fact that the neck contains so many vital structures gathered closely together. Early deaths usually result from damage to the major neck vessels with overwhelming haemorrhage.

CLINICAL MATERIAL

This series consists of 266 consecutive cases of penetrating wounds of the neck admitted over a 4-year period. The age of the victims varied from 12 to 71 years, the average age being 26 years. Roughly consistent with the population group served by this hospital, 58% of the patients were Bantu and 42% Coloured. Male patients constituted 90% of the total.

Injury was inflicted in 256 cases by means of a knife, in 3 cases by gunshot and in the remainder by various implements such as window glass, pencils, screwdrivers and bicycle spokes.

All wounds penetrated the platysma. The entrance wound was sited on the left side in 71% of cases, in keeping with the assailant usually being right-handed, and 23% of wounds were on the right side, 4.5% in the mid-line anteriorly and 1.5% at the back of the neck.

In 7.8% of cases the wound was cervicothoracic, usually presenting with a pneumothorax or haemothorax, but sometimes involving large vessels in the mediastinum.

Of the total number of 266 cases, 56% had associated injuries, most commonly involving the chest wall, upper limb and face.

Structures Involved

In many patients more than one structure was involved. The injuries found in those treated by surgery are shown in Table I.

Of the total 266 patients admitted, 122 were managed conservatively throughout their course, i.e. the wounds were sutured, blood transfusion was given if indicated, and the blood pressure and pulse rate were recorded at ½-hourly intervals. Operative intervention was carried out in the remaining 144 patients. The details are shown in Table II.

TABLE I. ANATOMICAL DISTRIBUTION OF INJURIES

Site of injury	No. of cases
Arteries	
Common carotid artery	7
Subclavian artery	5
Int. carotid artery	3
Vertebral artery	2
Thyrocerivical trunk	2
Branches of ext. carotid artery	6
Arteriovenous fistula	
Common carotid artery to internal jugular vein	2
Common carotid artery to innominate vein	1
Veins	
Int. jugular vein	18
Ext. jugular vein	10
Subclavian vein	5
Nerves	
Spinal cord	8
Brachial plexus	5
Sympathetic chain	4
Circumflex nerve	2
Facial nerve	2
Hypoglossal nerve	1
Recurrent laryngeal nerve	1
Phrenic nerve	1
Accessory nerve	1
Thoracic duct	3
Larynx	2
Trachea	11
Pharynx	4
Oesophagus	6
Parotid gland	2
Thyroid gland	4
Pleura	19

TABLE II. OVER-ALL MANAGEMENT

	No. of cases
Conservative management	122
Operative management*	
Oesophagobronchoscopy	5
Endoscopy and exploration	3
Exploration alone	136

*Delay to operation: less than 6 hrs 125 cases, more than 6 hrs 19 cases.

Of the 139 cases explored, 81 had damage to structures which made operative intervention advisable, while 58 had no more than minor oozing from muscle.

The main problems before exploration were arrest of haemorrhage, restoration of a clear airway, and treatment of blood loss.

Arrest of haemorrhage is best carried out by digital pressure over a pack. Suture of the wound is inadvisable for this allows a haematoma to develop, which, when large enough, will embarrass respiration.

Restoration of a clear airway entails aspiration of the mouth and trachea, and occasionally passage of an intra-tracheal tube or a tracheostomy can be done under local anaesthesia.

Blood replacement was often massive, amounting to 4,500 ml. in each of 3 patients with major arterial damage. The average replacement in operative cases was 1,000 ml.

Neck explorations require adequate exposure. A long incision following the anterior border of the sternomastoid has been used, angling it back to detach the sternomastoid from the clavicle if required. Transection of the clavicle is sometimes necessary in dealing with subclavian vessel injury. Median sternotomy or thoracotomy via an anterior intercostal space incision may be needed.

Exploration must be thorough and performed by someone who is experienced in neck surgery. The missed injuries and their sequelae are noted in Table III.

TABLE III. MISSED INJURIES

Missed injury	Sequela
Parotid gland	Fistula—settled
Thoracic duct	L. chylothorax—aspiration
Common carotid artery	Development of haematoma. Vessel repaired after 24 hours
Subclavian artery	Development of traumatic aneurysm—septicaemia and death
Pharynx	Whistling through incision at end of operation when intratracheal tube was removed—repaired
Oesophagus	Mediastinitis—death

MANAGEMENT OF SPECIFIC INJURIES

Vascular Injuries

Injury to the vascular system in the neck was sustained in 49 cases. Death occurred in 5, giving a mortality rate of approximately 10%. Of 29 wounds involving the contents of the carotid sheath, only 3 were in the posterior triangle. The vast majority were over the sternomastoid or in the anterior triangle. There were 33 injuries to major veins. In most cases the damaged vein was ligated; however, repair of the subclavian vein was carried out in 3 instances and of the internal jugular vein in 6. When ligation of the veins was carried out no untoward effects followed.

The only positive indication for repair of a vein would be if both internal jugular veins were damaged, when it would be advisable to repair one in order to obviate cerebral complications ensuing from bilateral venous occlusion.¹

Damage to the external carotid artery or small branches was treated by ligation, but injuries to the common and internal carotid arteries and the vertebral and subclavian arteries provide special problems and will be discussed separately. Patients with injuries to these major vessels usually arrived in a state of shock with evidence of active bleeding, but 4 of our 17 patients were neither shocked nor bleeding actively on admission.

Common or internal carotid artery. There were 7 injuries to the common carotid artery and 3 to the internal carotid artery (Table IV). The mortality rate was 20%. The fact that the majority of arterial wounds in this series were caused by sharp implements made repair or anastomosis relatively easy. Bullet wounds, with resultant loss of tissue, may cause technical difficulties.

Repair of the internal and common carotid arteries is indicated in all instances in view of the high incidence of cerebral complications. In the case of bullet wound injuries, this may well necessitate the employment of a graft or prosthesis. At Baragwanath Hospital, Lipshitz

TABLE IV. INJURIES TO CAROTID ARTERIES

Vessel	Treatment	Result
Int. carotid artery (3)	2 repaired 1 ligated	Satisfactory Satisfactory
Common carotid artery (7)	1 ligated 3 repaired 1 repaired	Hemiparesis Satisfactory Coma and hemiplegia 40 hrs post-op.—recovery
	1 repaired	Died (cardiac arrest)
	1 repaired	Persistent coma and hemiplegia—died 3 days later

found a morbidity of 10-15% in cases where the common carotid artery was tied after the most careful pre-operative studies had been made.² The high incidence of hemiparesis in cases of trauma to the carotid arteries is thought to be due to the concomitant shock.³ The incidence in this series was 30%.

Arteriovenous fistula. Three cases were treated in this series (Table V). This injury may well be overlooked as

TABLE V. ARTERIOVENOUS FISTULAE

Type	Time of operation	Treatment	Result
Common car. art./ int. jug. vein	20 days	Ligation vein.	No hemiplegia
	25 days	Repair artery Repair with graft. Sec. haemorrhage (15 days). Ligation	No hemiplegia
Common car. art./ innominate vein	3 days	Combined approach. Sternal split. Trans-thoracic	Haemorrhage. Death on table

there is sometimes little evidence of a haematoma. Two of our patients were referred to us from neighbouring hospitals 20 and 25 days respectively after injury. Auscultation will, however, reveal the telltale murmur at an early stage.

Vertebral artery. There were two cases of injury to the vertebral artery in this series, both of whom recovered fully. In one, the artery was damaged just before it entered the foramen costotransversarium of the 6th thoracic vertebra and bleeding was controlled by proximal and distal ligation. The other was damaged between the 4th and 5th cervical vertebrae and was managed by proximal ligation in the neck, and distal ligation after nipping away the transverse process of the 4th cervical vertebra.

This is an injury with a high mortality rate. According to Fogelman and Stewart,⁴ this injury should be suspected with (a) haemorrhage from a posterior or lateral neck wound not controlled by proximal occlusion of the common carotid artery or (b) bleeding from the posterolateral neck area in association with the fracture of a cervical transverse process.

Farley *et al.*⁵ advise that vertebral artery injuries should be repaired, but this is extremely difficult in the first or extra-osseous part of the artery and impossible in the second part. Most authorities^{4,6} agree that in the first part the artery should be ligated proximally and distally. In

the second part Shirkey *et al.*⁶ treated 3 cases successfully by ligation in continuity and we have since done this successfully in one patient. Although retrograde flow from intracranial anastomotic channels is often profuse, this can usually be controlled by temporary plugging.

Subclavian artery. There were 5 cases, all associated with a supraclavicular wound. The results of treatment are given in Table VI.

TABLE VI. INJURIES TO SUBCLAVIAN ARTERIES

Case	Treatment	Sequel
1	Ligation	Satisfactory
2	Ligation	Satisfactory
3	Repair	Postop. haemorrhage—ligation
4	Ligation	Missed at initial exploration elsewhere. Postop.—satisfactory
5	—	Missed at exploration—development traumatic aneurysm. Septicaemia—death

Injuries to the subclavian artery are often associated with damage to the pleura and should be suspected in a cervicothoracic injury with evidence of a large haemothorax or haemopneumothorax. Two of our patients had evidence of a large haemopneumothorax. The remaining 3 had no evidence of penetration of the pleural cavity but had a widened mediastinal shadow. Conversely, the presence of a pneumothorax with little blood makes the likelihood of damage to the subclavian vessels much less. An intrapleural catheter should be inserted under local anaesthesia before commencing exploration of the neck.

As haemorrhage from this vessel may be exsanguinating it is wise to divide or resect a portion of the clavicle at an early stage.⁷ Median sternotomy⁸ or thoracotomy⁴ may be necessary to ensure proximal control.

Repair of this vessel is advisable, although ligation is often carried out uneventfully. There is the possibility of development of ischaemic symptoms in the upper limb—a subsequent patient of ours has lost 2 fingers due to gangrene. Ligation of the subclavian artery proximal to the vertebral take-off may, in older individuals, lead to the 'subclavian steal syndrome'.⁹

Larynx and Trachea

In all 13 patients with this type of injury the entrance wound was in the anterior triangle. There were 3 deaths. Details of this type of injury are given in Table VII.

TABLE VII. LARYNX AND TRACHEA

Site	No. of cases
Larynx	2
Trachea	7
<i>Presenting feature</i>	
Surgical emphysema	8
Blowing wound	4
Airway obstruction	1
<i>Assoc. injuries in neck</i>	
Thyroid	3
Int. jug. vein	1
Oesophagus	1
Venous branches	3
<i>Treatment</i>	
Repair laceration—separate tracheostomy	7
Tracheostomy via laceration	3
Repair laceration—no tracheostomy	1
Nil (died during laparotomy)	1
Observation	1

The presence of surgical emphysema of the neck in a patient with a neck wound indicates perforation of the larynx, trachea, oesophagus or apical pleura. Damage to the pleura will be shown on chest X-ray as a pneumothorax unless the pleura is adherent at the point of injury.

Pont³ found that the greatest danger to the patient existed when there was an associated vessel injury. In these cases, presenting usually with surgical emphysema and active bleeding, he advised a tracheostomy under local anaesthesia with the introduction of a cuffed tube, so that the respiratory passages could be cleared and sealed off before neck exploration. Alternatively an endotracheal tube can be inserted.

Du Toit and Fennell¹⁰ advise transport of these patients to hospital in the Trendelenburg position to prevent blood or saliva from reaching the lungs, as with tracheal wounds adequate coughing is severely impaired. They advise early direct laryngoscopy or bronchoscopy to assess the extent of damage, with special reference to recurrent laryngeal nerve injuries.

Oesophageal injuries must always be suspected when the trachea is involved. Wounds of the lower neck are frequently associated with pleural damage, and the consequent haemopneumothorax aggravates any respiratory insufficiency.

After exploration, repair and formal tracheostomy, it is important to drain adequately in view of the possible development of mediastinitis. Careful toilet of the tracheobronchial tree is required.

Pharynx and Oesophagus

There were 10 cases in this series, 4 involving the pharynx and 6 the oesophagus. All the entrance wounds were in the anterior triangle or over the sternomastoid. In 4 of them the presenting symptom respectively was oral bleeding, surgical emphysema, dysphagia and a painful local swelling. In the remainder the picture was overshadowed by associated damage to major vessels, trachea or larynx.

TABLE VIII. PHARYNX AND OESOPHAGUS

Site	No. of cases
Pharynx	4
Oesophagus	6
<i>Assoc. injuries</i>	
Trachea	1
C. carotid art.	1
Int. jug. vein	2
Ext. jug. vein	1
<i>Treatment</i>	
Repair and drainage	5*
Drainage only	1
Repair, drainage and tracheotomy	3
Observation	1

*Includes 1 death.

Postoperative complications occurred in 2 patients only. The patient who died had associated tracheal transection and developed mediastinitis, empyema and septicaemia, and died 10 days postoperatively. The other patient with almost complete transection of the oesophagus was operated on 16 hrs after injury. Despite the development of mediastinitis, empyema and an oesophageal fistula, he recovered.

The presentation of injury to the pharynx and oesophagus is less dramatic than vascular and tracheal injuries and there is great danger of it being missed, with consequent development of mediastinitis. It is particularly in this type of case that we have found endoscopy, as advised by Swartz,¹¹ helpful. It may indicate the need for surgery, limit the extent of exploration or may induce one to treat a particular patient conservatively.

Repair should, if possible, be done in 2 layers. Drainage and the use of antibiotics will lessen the incidence of complications due to infection. A nasogastric tube should be inserted for feeding purposes.

Thoracic Duct

There were 4 injuries to the thoracic duct, 3 of which were treated by ligation without complication. In the remaining patient the injury was missed at exploration and the patient developed a chylothorax. This was treated by aspiration on 5 occasions and by the insertion of 3 chest catheters before the condition subsided.

The thoracic duct may be ligated without complication and, in view of the high incidence of breakdown, repair is not advised.⁴

Should chylothorax develop, conservative measures may be employed initially, but these should be abandoned after 10-12 days if the fistula persists.¹² Thoracotomy and ligation is then advised.

Nerves

There was a total of 26 cases of nerve injuries. Eight patients had damage to the spinal cord and there were 5 injuries to the brachial plexus. Lacerations of the brachial plexus should be repaired at the primary exploration and followed by vigorous physiotherapy.

Parotid Gland

Injuries of the parotid gland are often associated with damage to the facial nerve. If there is evidence of facial paralysis the cut ends of the facial nerve should be approximated. The prospects of recovery are said to be good.

Pleura

There were 19 instances of damage to the pleura and this high incidence is, as Pont⁷ states, 'An excellent reminder to the surgeon that the apex of the lung is a cervical structure'. A chest catheter was initially inserted under local anaesthetic in all 12 cases where neck exploration was carried out.

As previously mentioned, the absence or virtual absence of blood in the pleural cavity makes damage to a large vessel very unlikely.

On exploration of the neck, no attempt was made to repair the pleural defect and reliance was placed upon the chest catheter for relief of the pneumothorax or haemopneumothorax.

Mediastinitis

The development of mediastinitis is suggested by the persistence of pyrexia, dysphagia, extension of pain to the substernal and interscapular regions, respiratory distress and hoarseness.

X-ray studies of the chest and neck may show any or all of the following signs:¹²

1. Widening of the mediastinum.
2. Surgical emphysema in the neck or mediastinum.
3. Anterior displacement of the trachea and oesophagus in the neck.
4. Fluid or gas in one or both pleural spaces.

The superior mediastinum down to the level of the 4th or 5th thoracic vertebra can be drained by a cervical approach, retracting the carotid vessels laterally, and the trachea and oesophagus medially. This was done in one of our cases but, due to the development of an abscess at a lower level, a posterior extrapleural mediastinotomy after resection of the 7th rib was necessary. Despite this the patient died. Two other patients developed mediastinitis and empyema following an oesophageal injury. In neither case was the mediastinum explored but tube drains were put into the chest cavity; one died 10 days post-operatively, while the other eventually made a complete recovery.

MORTALITY AND COMPLICATIONS

There were 9 deaths in this series of 266 patients studied. The pertinent clinical features are shown in Table IX.

The neck injury alone was responsible for the death of 7 of the 9 patients. Of this group, 4 had a vascular injury, 1 an associated laryngeal injury, 1 an injury of trachea and oesophagus and the remaining patient probable injury to the oesophagus missed at exploration.

The low mortality rate of 3.4% is undoubtedly due to the fact that gunshot wounds were the cause of injury in only 1% of our cases. Fogelman and Stewart⁴ had a mortality of 11% in a series of 100 patients, 35 of whom had bullet wounds. Bullet wounds were present in 8 of the 11 fatalities. Another factor which may well have lowered the hospital mortality rate is the fact that Livingstone Hospital is the only non-White hospital covering a wide area. Delays, necessitated by transport, must result in the death of some severe injuries while still *en route* to us.

Mortality rates in other series were 7.7%,³ 6%⁵ and 9.8%.⁶ In the last 2 series, gunshot wounds caused a considerable proportion of the injuries. The ready availability of firearms in the USA, a fact which has recently received much publicity, accounts for this high incidence.

The mortality rate was 5.6% for the 125 cases which were brought to the operating theatre less than 6 hrs after injury and 10.5% for the 19 patients who had delayed surgery. However, this latter figure is possibly inflated, as death was probably unrelated to the time of operation in the patient with a carotid innominate AV fistula. There was no mortality in the selected group who were managed conservatively.

Other series^{4,6} show figures of 4% and 10.7% for those cases explored less than 6 hrs following injury, and figures of 20% and 30% for those having delayed surgery. These figures have been used as a strong argument for early surgery.

No less interesting is the incidence of complications in the group of 19 patients who had delayed explorations.

TABLE IX. DEATHS

Race	Sex	Age	Anatomical injury	Time of operation after injury	Treatment	Cause of death	Time
C	M	20	? Oesophagus (no damage shown on 2 explorations)	18 hrs	Exploration: muscle damage only. Mediastinitis at 4 days. Exploration (rep). 6 days: abscess in post-mediastinum. R post-extrapleural mediastinotomy	Mediastinitis	20 days
C	M	38	R int. jug. vein, larynx	< 6 hrs	Repair vein and larynx. Tracheostomy	Aspiration pneumonia	2 days
C	M	18	Trachea, oesophagus	< 6 hrs	Repair oesophagus and trachea. Tracheostomy	Mediastinitis, empyema, septicaemia	10 days
C	F	18	Common car. artery	< 6 hrs	Repair artery	Coma and hemiplegia	3 days
B	M	34	Trachea (10 holes in small bowel and colon)	< 6 hrs	Nil. Died during laparotomy	Cardiac arrest	—
C	M	65	Common car. artery, int. jug. vein, haemopneumothorax	< 6 hrs	Chest catheter. Repair artery, ligation vein. Died at completion operation	Cardiac arrest	—
B	M	23	Subcl. art. and vein, int. jug. vein	< 6 hrs	Section clavicle, suture vein. Arterial damage missed	Traumatic aneurysm, septicaemia	12 days
B	M	33	L common car. art./L innom. vein— AV fistula	3 days	Sternal split and thoracotomy. Profuse haemorrhage	Blood loss	—
C	M	18	Ext. jug. vein (femoral artery transected)	< 6 hrs	Exploration neck. Tracheotomy. Repair femoral artery	Blood loss, cerebral damage	1 hour

No major damage was found in 10 and no complications ensued. Two patients with AV fistulae were first referred to us from the country several weeks after the initial injury and were treated without major mishap. Details of the remaining 7 patients are given in Table X.

TABLE X. LATE OPERATIVE CASES

Anatomical injury	Operation	Complications
AV fistula (L common carotid/L innominate vein)	Attempted repair	Operative death
L common carotid artery and int. jug. vein	Ligation	Hemiplegia
Common carotid artery	Repair	Hemiplegia 40 hrs postop. (thrombosis on angiogram)
Subclavian artery	Ligation	Nil
Trachea	Tracheotomy	Nil
Oesophagus	Repair	Mediastinitis, empyema, oesophageal fistula, eventual recovery
Oesophagus	Exploration	Mediastinitis—death

There seems no doubt that the complication rate is high in patients with vascular and oesophageal injuries who are explored late.

DISCUSSION

The frequency of assaults with knife and gun appear to be on the increase and have been the cause of newspaper headlines in our own and other countries during recent times. A short while ago, leading articles in the *British Medical Journal*^{23,24} carried reference to this phenomenon. In a non-White hospital a large percentage of acute surgical intake, particularly over the weekend, is traumatic in nature. This series shows the extent of the problem when

these penetrating wounds involve the neck. Efficient management is essential in order to keep hospital stay to a minimum.

Various authors, in reporting series of patients,^{4,5} have come to the conclusion that all wounds penetrating the platysma should be formally explored. Shirkey *et al.*⁶ feel that early exploration is required whenever a vascular, laryngotracheal or oesophageal injury is suspected. Pont¹ found that only 30% of the wounds were deep and warranted exploration.

In our present series of 266 patients 127 were observed without mortality. Of the 139 patients who were explored, 81 had damage to structures which made operative intervention advisable, while 58 patients had nothing more than minor bleeding from muscle damage. Thus 185 of 266 patients with stab wounds in the neck, or nearly 70%, had not sustained an injury to a vital structure. However, both the mortality and incidence of serious complications were, in keeping with other series,^{4,6} higher in those treated by delayed surgery. It is difficult in a retrospective series treated by several surgeons to assess whether indications for early surgery existed in these cases, but our experience of the treatment of subsequent cases makes this likely.

Recently various articles have been published^{15,16} showing that only half the patients with penetrating stab wounds of the abdomen have visceral damage. Various findings, such as lack of bowel sounds and the presence of guarding or rigidity, have been used in an effort to pinpoint the patients in whom surgery is required.

We have tried in similar fashion to divide patients with penetrating neck wounds into those in whom surgery is mandatory and those where, apart from closure of the neck wound, it is not required at all. It is frequently pointed out that an apparently simple neck wound may cover severe underlying damage, but a similar argument may apply to penetrating wounds of the abdomen.

We have attempted to assess features which may be helpful in differentiating the two groups, and the following factors must be taken into account in assessing the need for exploration. An important proviso in this assessment is that, in view of the deleterious effects of wrongly delayed surgery, it should be made by the surgeon himself. A complete and careful clinical examination is essential and chest radiography should be included. Endoscopy should be undertaken if there is any doubt about the integrity of the food or respiratory passages.

Indications for Conservative Management

1. *Duration since injury.* If more than 12 hours have elapsed since injury without the development of signs of serious damage, the wound is likely to be innocuous.

2. *Site and direction of wound.* Wounds in the posterior triangle of the neck are usually innocuous, although a check should be made for neurological damage. In this series, damage to midline structures and vessels enclosed by the carotid sheath were in only 3 cases caused by wounds in the posterior triangle. What is perhaps even more important is assessing the direction of the wound. The history is rarely helpful in this respect, but the shelving of the skin wound usually gives valuable information, and further information can be obtained by careful palpation for tenderness circumferentially on a radius 1 in. from the wound.

3. *Size of wound.* A long laceration usually indicates a superficial wound without damage to deep structures. However, the larynx or trachea which lie superficially are sometimes injured.

4. *Lack of tenderness on palpation.* If the carotid vessels, trachea and oesophagus are clearly palpable and not tender throughout their length, injury to these structures is extremely unlikely.

5. *A supraclavicular wound* with a pneumothorax, but little or no evidence of blood in the pleural cavity, is unlikely to have damaged the large vessels.

6. *Negative findings on oesophagobronchoscopy.* Frequently, no vascular injury is suspected but one is doubtful of injury to the trachea or oesophagus because of local tenderness. We have tended to use endoscopy increasingly in this type of case. We have also used endoscopy in the patient where exploration is in any case indicated for possible arterial injury, as we feel that negative endoscopy does much to limit the extent of the exploration. Endoscopic findings may at times also be of great value in planning the anaesthetic in cases where the trachea or bronchi are damaged.

Positive Indications for Explorations

1. Active bleeding, the presence of a haematoma, an absent distal pulse, the presence of a large haemothorax

in association with a supraclavicular wound, the presence of a bruit, and finally any wound in the direction of the large blood-vessels where they are not distinctly palpable and not tender along their course.

2. The presence of surgical emphysema in the neck without an associated pneumothorax, dysphagia, haemoptysis or haematemesis, and any wound in the vicinity of the trachea, larynx, pharynx or oesophagus unless pathology is excluded on oesophagobronchoscopy.

3. Evidence of interruption of continuity of nerves.

4. A widened mediastinal shadow or the presence of mediastinitis.

SUMMARY

It is suggested that careful assessment of penetrating wounds of the neck by the surgeon, will allow separation of the cases where exploration is mandatory from those where conservative management can be instituted. The conservative management should be watchful, so that untoward signs and symptoms may be detected early. If there is any doubt, full exploration through a wide incision should be carried out. Quite possibly a higher incidence of gunshot wounds would make operative intervention more frequently required due to a wider path of destruction.

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