

WOUND INFECTION IN A CASUALTY DEPARTMENT

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An enquiry into the incidence of wound sepsis in the Casualty Department of Groote Schuur Hospital has been carried out. An unselected group of consecutive patients was used for this investigation. Three sub-divisions of this group were made:

1. Patients operated on for minor surgical conditions in the casualty operating theatre. Patients in this group were referred either by their own doctors or from the surgical outpatient department — theatre cases.
2. Patients brought to hospital with injuries caused by assault — assault cases.
3. Patients brought to hospital with injuries caused by traffic accidents — traffic cases.

TREATMENT OF WOUNDS

The following system was adopted for the treatment of all wounds:

1. *Swabs.* These were taken immediately and also after 3 days (if the wound had broken down), and were examined in the Department of Bacteriology after 24 hours' incubation. Sensitivity tests were always done.

2. *Preparation of skin.* The surrounding skin was carefully cleaned with 2% 'cetavlon', after which the area was swabbed with 70% alcohol. The area was draped and the wound inspected.

3. *Debridement.* Severely lacerated wounds were debrided. It was seldom necessary to open up tissue planes because the usual wounds seen in ordinary casualty practice are relatively minor in nature and do not require major debridement.

4. *Local antibiotics.* In the first part of the investigation no local antibiotic was instilled into the wound; in the second part the wounds were sprayed as a routine with antibiotic powder.

5. *Suture.* Suture of muscles was seldom performed. Occasionally suture of the perimysium was required. In this way necrosis of muscle fibres was kept to a minimum. All wounds were sutured in layers, using catgut for the deeper layers and 'dermalon' for the skin.

6. *Drainage.* As a rule wounds were not drained. In this series of 336 cases, not a single one had been drained. However, it is felt that if drainage is necessary, it should be carried out using soft-rubber glove drains; very rarely is anything firmer required.

7. *Systemic antibiotics.* Two types of systemic antibiotics were used, viz. (a) the narrow-spectrum antibiotics consisting of penicillin (in the form of 'bicillin') and streptomycin, and (b) the broad-spectrum antibiotics, which were usually 'chloromycetin' or 'terramycin'. The use of narrow-spectrum antibiotics depended on the individual casualty officer. Some used bicillin as a routine, others again preferred not to give any antibiotic at all unless indicated at a later stage. Broad-spectrum antibiotics, however, were only used when pus had actually formed and when a swab report indicated to which antibiotic the particular organism was sensitive. An exception to this rule was made in the case of animal or human bites, when treatment with a broad-spectrum antibiotic was begun immediately.

Subsequent Examination of Wounds

As a routine, the first check was made on the fourth day; thereafter, if the wound appeared satisfactory, the patient was instructed to re-attend 3 days later for removal of sutures. Frequent inspection of the wound was not made owing to the possibility of introducing cross-infection.

RESULTS

Assessment of Infection

The results of healing were divided into 3 groups:

1. Where healing took place by first intention (within 7 days).
2. Where minor degrees of infection had taken place, but where, either owing to treatment or to the resistance of the natural defences of the body, healing still took place within 10 days.
3. Where complete breakdown had taken place with the formation of frank pus.

Systemic Antibiotics and Wound Healing

The first part of the investigation dealt with the rate

of wound healing and the effect of systemic antibiotics thereon.

Altogether 184 patients were investigated and the results are indicated in Table I. This shows that approximately

TABLE I. TYPES OF HEALING

Patients	Total	By first intention	Minor infection	Complete breakdown	
				No.	%
Theatre cases	47	39	6	2	4
Assault cases	112	79	22	11	14
Traffic cases	25	21	4	0	0
Total	184	139	32	13	7

4% of theatre cases, 14% of assault cases and 0% of traffic cases broke down owing to infection after cleaning up in the casualty department.

It will be observed (Table II) that of 86 wounds treated with bicillin 9% broke down, whereas without bicillin only 3% broke down. However, the obvious interpretation of these results is misleading.¹ The patients who were treated with bicillin were a selected group in whom the casualty officer considered break-down was liable to occur and in whom infection had probably been present from the start. It is likely that the figure of 9% would have been exceeded had bicillin not been given. Those patients who were not given bicillin were obviously those in whom clean healing was expected.

Local Antibiotics and Wound Healing

The next project was to consider the effect of local treatment with antibiotics. The antibiotic used was a poly-

TABLE II. EFFECT OF SYSTEMIC ANTIBIOTICS ON WOUND HEALING

Patients	Total	Type of healing		
		By first intention	With minor infection	With complete breakdown
With bicillin				
Theatre cases	9	5	4	0
Assault cases	62	37	15	10
Traffic cases	15	12	3	0
Total	86	54	22	10*
Without bicillin				
Theatre cases	38	34	2	2
Assault cases	50	42	7	1
Traffic cases	10	9	1	0
Total	98	85	10	3**

* 10 of 86 patients treated with bicillin broke down = 9%.

** 3 of 98 patients not treated with bicillin broke down = 3%.

TABLE III. EFFECT OF LOCAL ANTIBIOTICS ON WOUND HEALING—PBN POWDER USED IN 152 PATIENTS

Patients	Total	Type of healing		
		By first intention	With minor infection	With complete breakdown
Theatre cases	0	0	0	0
Assault cases	138	121	16	1
Traffic cases	14	12	1	1
Total	152	133	17	2

mixin-bacitracin-neomycin (PBN) powder, which was sprayed on as a jet. This was applied to all anatomical layers of the wound as it was being stitched up. Here 152 cases were investigated and only 2 of these broke down completely, i.e. less than 2% (Table III).

Swabs

At the start of the enquiry all wounds were swabbed on admission (or in the case of theatre wounds, immediately before suturing the skin). Later, however, only potentially septic wounds were swabbed on admission. Wounds which on routine inspection after 3 days showed signs of breaking down were also swabbed. All swabs were cultured and the cultures examined after 24 hours' incubation. Sensitivity tests were always done.

Table IV indicates the result of wound swabbing. Altogether 31 fresh wounds were swabbed and 25 at the second dressing (those which showed signs of breaking

TABLE IV. RESULTS OF CULTURING WOUND SWABS

Patients	Total	Organisms cultured						
		Staph. aureus		Other organisms*		No growth**		
		Initially	After 3 days†	Initially	After 3 days†	Initially	After 3 days†	
Theatre cases	3	6	0	2	0	2	3	2
Assault cases	23	18	4	3	5	4	14	11
Traffic cases	5	1	1	0	1	0	3	1
Total	31	25	5	5	6	6	20	14

* Including coliforms, *B. subtilis*, and paracolon organisms.

** After 24 hours' incubation.

† In the wounds which had broken down.

down). It will be noted that *Staphylococcus aureus* was isolated in 15% of fresh wounds and 20% of suppurating wounds; in both groups sterile cultures were obtained in 40%. This low isolation rate is similar to that recorded by Buchanan *et al.*² who offered the explanation that their patients were attended to with minimum delay between accident and treatment, that the wounds treated were in the main small ones, and that they used a particular culture technique. In our group of patients we have found that it is only the assault cases that present late (usually owing to a state of drunkenness at the time of injury). Accordingly the incidence of sepsis is higher in these patients, although the organism-isolation rate remains low, particularly when the cultures are incubated for only 18 hours, indicating the need for more prolonged culture. This subject is now being pursued.

CONCLUSIONS AND SUMMARY

1. A report on 336 patients with wounds treated in the Casualty Department of Groote Schuur Hospital is made. The incidence of wound infection is now 2%.

2. The traffic accident patients do best because they are brought into the casualty department soonest (within minutes).

3. Stab and assault patients do badly because many present themselves at hospital late, with wounds already septic.

4. Patients with home accidents do quite well since they

usually have clean wounds and come to hospital early for attention.

5. Local spraying of PBN powder into the wounds has reduced the incidence of serious infection to less than 2%.

6. Bacteriological examination of septic wounds did not always reveal the presence of organisms. Whether this was due to technical difficulties in our laboratories is now being further investigated.

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