of anthrax in this department. His duties consisted in handling a truck carrying hides from beam house into the room where tanning is done. These hides had been subjected to a thorough soak, had been fleshed and split, also soaked in lime before being placed upon a truck for transferring to the tanning department. The most probable source of infection in this case would seem to be from spores of anthrax on the sides of the truck, thereby infecting the man using this truck. Typical course of anthrax, positive diagnosis.

CASE 9. Malignant pustule form—fatal. Man, 64 years of age, employed as a brush-maker in sorting over quantities of horse hair and bristle recently received from China, developed on April 8 a typical anthrax pustule covering two-thirds area of lower lip and right chin. Pustule most virulent at the edge of mucous membrane. The pustule was excised on April 12, followed by much edema and enlargement of the glands, coma and death on April 14. Lesion showed anthrax bacillus.

CASE 10. Erysipelatous anthrax. Man, fifty years of age, employed in a currying shop of a tannery, consulted the shop physician on March 31 for a mild conjunctivitis of the left eye of two days' duration. There was a slight reddened area below left eye, very slight edema. On April 1 the swelling and redness had extended over the whole side of the face, closing completely the left eye. Temperature 101. Later in the day the edema extended to the neck, and there was some involvement of right eye. No typical lesion could be found. On April 2 the smear from the conjunctiva showed typical bacillus of anthrax. Recovery.

CASE 11. Wool-sorters' anthrax—fatal. Man, 52 years of age, employed as a wool-sorter, consulted the physician at his office on March 21, because of a skin eruption. Examination found swelling on the left side of neck extending towards the sternum. Temperature 102, pulse 110. Next morning swelling had increased greatly, extending to right neck. Patient complained of violent headache. Temperature 103, pulse 120. What was thought to be a pimple on the neck was burned with pure carbolic acid and corrosive poultices applied. March 24 patient was seen again. Temperature had dropped to subnormal, marked collapse, cold hands and feet. Nurse reported a large bloody stool, patient conscious and rational. Died March 25. Inoculation into animals developed typical anthrax. The particular consignment of wool worked on by this man was recently received from New Mexico, and was of an extremely dirty grade.

The State Board of Labor and Industries has prepared and distributed to the various trades and occupations in which anthrax is a possible source of infection a set of rules and regulations for the prevention of this disease.* These rules consist chiefly in preventing the carrying of hides on shoulders or against bare arms and neck, the supplying of gloves for workmen engaged in handling hides, and gauze masks for workmen employed in dusty processes of manu-

* Industrial Bulletin No. 6. Rules and Regulations Suggested for the Prevention of Anthrax. Copies furnished free on application, 7 Beacon Street, Boston.

facture, in which infection from anthrax dust is a possibility. Separate washing and dining apartments and regulations for shop sanitation form a part of these rules. Employees and employers in the various industries named are cautioned about disregarding any cut or scratch or pimple, however insignificant or slight in appearance.

A SERIES OF FRACTURED SKULLS FROM THE SURGICAL RECORDS OF THE BOSTON CITY HOSPITAL, 1902-1917.*

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[From the Third Surgical Service and the Fourth Medical Service of the Boston City Hospital.]

THIS is intended as a preliminary statistical study of fractured skull cases during the years 1902-1917. It is to be remembered that the clinical material of the Boston City Hospital is drawn from all parts of Boston, and that admissions include a large proportion of the police ambulance and severe industrial accident cases.

The diagnosis of fractured skull was made 540 times; in 330 cases it was definitely proved by palpation, x-ray and operation or autopsy. This preliminary paper deals only with these definitely proved cases. The records were not as complete in most cases as we should like them, so that in some records, age, sex, etc., were not noted.

The frequency of fractured skulls is tabulated in decades in the following table:

	OPERATED		NON-OPERATED	
1st decade	Relieved....	15	Relieved....	17
	Dead.....	7	Dead.....	17
2nd decade	Relieved....	8	Relieved....	9
	Dead.....	9	Dead.....	3
3rd decade	Relieved....	7	Relieved....	13
	Dead.....	5	Dead.....	8
4th decade	Relieved....	12	Relieved....	25
	Dead.....	5	Dead.....	9
5th decade	Relieved....	9	Relieved....	24
	Dead.....	11	Dead.....	14
6th decade	Relieved....	2	Relieved....	6
	Dead.....	4	Dead.....	8
7th decade	Relieved....	1	Relieved....	6
	Dead.....	3	Dead.....	1
8th decade	Relieved....	0	Relieved....	1
	Dead.....	0	Dead.....	2
9th decade	Relieved....	0	Relieved....	2
	Dead.....	1	Dead.....	1

The causes as given in the records are collected under the following heads:

Accident	271 cases
Alcohol	60 "
Suicide	8 "
Assault	15 "
Unknown	1 case

A number of cases were combinations of alcohol and accident or alcohol and assault. In such cases both causes are given under separate heads.

* Presented at the September monthly clinical meeting of the Boston City Hospital House Officers' Association.

The type of injury in the 330 cases is shown in the following table:

Simple fractures	186 cases
Compound fractures	147 "
Depressed fractures	114 "

Below are given the results of the operated and non-operated cases:

Operated cases	123	} 48.7%
Relieved	60	
Dead	63	
Non-operated cases	207	} 51.3%
Relieved	114	
Dead	93	

Below is given the time of death after operation:

Operated and died within 3 hrs. after entrance	27
Operated and died within 24 hrs. after entrance	13
Operated and died within 3 dys. after entrance	7
Operated and died within 7 dys. after entrance	8
Operated and died several weeks after entrance	8

Cause of death in those cases which died from one to several weeks after operation was due to septic meningitis, erysipelas, pneumonia, brain abscess, or delirium tremens.

Special diagnostic work, as recorded in the past few years, is as follows: Blood-pressure findings were recorded in 39 cases. X-ray findings were recorded in 48 cases. Lumbar punctures were recorded in 11 cases. Fundi examinations were recorded in 33 cases.

It seems best to the authors to divide, in an arbitrary manner, the fractures, first as to location and second as to the two classes of simple and compound fractures. The classification as given below, of fractures of the frontal, parietal, temporal and occipital bones, does not mean that the fracture was of necessity confined to that bone alone, but that the larger part of the fracture was in that region.

I. FRACTURES OF FRONTAL BONE.

Simple	13	Operated	6	Relieved..	6
		Not operated..	7	Dead.....	0
Compound..	49	Operated	17	Relieved..	12
		Not operated..	32	Dead.....	5
				Relieved..	24
				Dead.....	8

Total 62, or 18.8%.

Many of the fractures of the frontal bone are found to be only of the outer table, breaking through into the frontal sinus. A large proportion of the compound fractures is of this type. Operation as given means a decompression, and not the simple cleansing and suturing of a scalp wound, although such a wound may extend to the line of fracture. The cases of a simple fracture of the frontal bone requiring operation were all those in which a definite depression was felt or shown by radiograph.

II. FRACTURES OF PARIETAL BONES.

Simple	60	Operated	24	Relieved..	11
		Not operated	36	Dead.....	13
Compound..	59	Operated	32	Relieved..	15
		Not operated..	27	Dead.....	17
				Relieved..	15
				Dead.....	12
Total 119, or 36.0%.					

These fractures might be classified as fractures of the vault. As a rule, the compound fractures were those which required immediate operation or at least within 24 to 36 hours after time of injury. The simple fractures, for the most part, unless a definite depression was made out, were operated upon at a time varying from 36 hours to 10 days. This was done only for definite signs of increasing intracranial pressure, i.e., increasing blood pressure, nausea, vomiting or choked disc, or for focal signs due to pressure over a motor area. Among the children many of the fractures of the vault were of the "cracked egg-shell" type. These latter are included under the head "not operated," "dead."

III. FRACTURES OF TEMPORAL BONES.

Simple	32	Operated	14	Relieved..	7
		Not operated..	18	Dead.....	7
Compound..	18	Operated	9	Relieved..	10
		Not operated..	9	Dead.....	8
				Relieved..	5
				Dead.....	4
				Relieved..	3
				Dead.....	6
Total 50, or 15.1%.					

Bleeding from one or both ears is not considered as diagnostic of fractured skull in this group, or in fracture of the base. Many of these diagnoses were made by aural men who found definite fracture through the bony wall of the auditory canal.

IV. FRACTURES OF OCCIPITAL BONE.

Simple	22	Operated	6	Relieved..	0
		Not operated..	16	Dead.....	6
Compound..	13	Operated	7	Relieved..	9
		Not operated..	6	Dead.....	7
				Relieved..	3
				Dead.....	4
				Relieved..	6
				Dead.....	0
Total 35, or 10.7%.					

Fractures in the above list are those of the upper portion of the occipital bone, due for the main part to a crushing injury over a small area of the bone. The operative results are interesting in that but three out of thirteen cases recovered.

V. FRACTURES OF BASE OF SKULL.

Simple 55	Operated 7	Relieved.. 1
	Not operated.. 48	Dead..... 6
Compound.. 9	Operated 1	Relieved.. —
	Not operated.. 8	Dead..... 5
Total 64,	or 19.4%.	

This gives, out of 330 cases, a total of 123 operated cases, of which 48.7% were *relieved*.

The decompressions have been divided into three definite groups:

a. Immediate at site of fracture, of which there were 78 cases. Thirty-six of these recovered and 42 died. A large number of these were operated for a compound fracture, either comminuted, depressed, or with extensive laceration of dura and brain.

b. Right subtemporal, until recently the operation of election for the relief of intracranial pressure in cases showing no localizing signs. Nineteen cases of this kind are recorded, 14 of which died and 5 recovered. One instance is recorded of a case discharged with a definite paralysis of the left arm following operation.

c. For localizing signs or symptoms, 13 cases, of which 4 died and 9 recovered. These for the most part were due to late development of signs from blood clot, lacerated brain or foreign body.

d. Occipital, 13 cases, 10 of which died and 3 recovered. All but one of these might be classified under immediate, but have been given a separate place due to the recent interest in the question of occipital decompression for fractures of the base, with increased pressure under the tentorium. One case was operated for definite localizing signs appearing three days after operation.

It seems of interest to note, in relation to prognosis, the mortality, considering the mental condition of the patient at entrance.

This table includes all cases in which the records state the mental condition of patient at time of entrance. The percentage of cases re-

Unconscious 112	Operated ... 52	Relieved 7	13.2%
	Not Operated 60	Dead... 45	
Conscious and irrational.. 50	Operated ... 21	Relieved 13	61.9%
	Not Operated 29	Dead... 8	
Conscious and rational.... 82	Operated ... 29	Relieved 24	82.7%
	Not Operated 53	Dead... 5	
Extreme shock..... 17	Operated ... 1	Relieved 4	20.0%
	Not Operated 16	Dead... 12	

lieved is seen to be in inverse proportion to the change from normal mental condition of the patient.

The original tabulation of cases and their findings offer facts which we have not discussed in detail, but wish to mention briefly.

The large proportion of the cases in which the pupils were dilated and fixed died, thus giving that one physical finding a fair guide to an unfavorable prognosis.

Some of the cases which were operated with the idea of a decompression had a small area of bone removed, usually subtemporal, and then the dura was left intact. These cases, as a whole, did badly, *i.e.*, pressure symptoms did not clear up rapidly if at all. The brain in one instance was found not pulsating, but the dura was not opened. In other cases pulsation of the brain began shortly after the dura was opened and the pressure relieved. Thus it seems necessary, for a complete decompression, to open not only the bone, but the dura as well.

Suture of the lacerated or incised dura was performed in several cases. The result was not satisfactory. Usually the dura could not be approximated. In one case a subdural abscess developed at this point, requiring subsequent operation. Later came a definite brain abscess, ending in meningitis and death.

A rubber tissue drain was inserted to the dura in several cases of clean decompression, *i.e.*, not for or following a compound fracture. There is no evidence that shows the relief of symptoms to be more rapid or complete following such treatment than in the cases closed up tightly after removal of a large bone flap with opening of the dura. The cases apparently indicating drainage due to bleeding not ceasing with relief of intracranial pressure were few in number. Infection followed with fatal results in several of these cases.

Our study of the above cases would seem to indicate: routine two-hour blood-pressure readings for the first 24 to 48 hours; lumbar puncture in all cases; fundus examination at time of entrance and at intervals indicated by the general condition; x-ray examination of all head injuries; withholding morphia until a definite diagnosis is made, and controlling of restlessness with bromides if possible; thorough neurological examination backed up and checked by consultation with neurological service.

There is a possibility of better operative results in fractures of the base by early recognition and relief of symptoms by extensive decompression, either tempo-parietal bone flap or occipital trephine.

The above series would indicate that operative results in view of prognosis are better in the first and fourth decades than at any other age.