VOL X. NOVEMBER, 1933 No. 2

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THE BULLETIN

of the

Vancouver Medical Association

Fractures

Clinical Section

Medical Relief

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THE VANCOUVER MEDICAL ASSOCIATION

BULLETIN

Published Monthly under the Auspices of the Vancouver Medical Association in the Interests of the Medical Profession.

Offices:

203 Medical Dental Building, Georgia Street, Vancouver, B. C.

Editorial Board:

DR. J. H. MACDERMOT

DR. M. McC. BAIRD DR. D. E. H. CLEVELAND

All communications to be addressed to the Editor at the above address.

Vol. X. NOVEMBER, 1933. No. 2

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Sickness and Benevolent Fund — THE PRESIDENT — THE TRUSTEES

VANCOUVER HEALTH DEPARTMENT

STATISTICS, SEPTEMBER, 1933

Total Population (Estimated)	247,251
Japanese Population (Estimated)	8,429
Chinese Population (Estimated)	7,759

	Number	Rate per 1,000 Population
Total Deaths	158	7.8
Japanese Deaths	9	13.0
Chinese Deaths	11	17.2
Deaths—Residents only	137	6.7
Birth Registrations	243	12.0
Male 127		
Female 116		

INFANTILE MORTALITY—

Deaths under one year of age	4
Death Rate—per 1,000 births	16.5
Stillbirths (not included in above)	7

CASES OF CONTAGIOUS DISEASES REPORTED IN CITY

	August, 1933		September, 1933		October 1st to 15th, 1933	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Smallpox	0	0	0	0	0	0
Scarlet Fever	11	0	23	0	28	0
Diphtheria	0	0	0	0	0	0
Diph. Carrier	–	–	0	0	0	0
Chicken-pox	10	0	11	0	10	0
Measles	0	0	0	0	1	0
Rubella	0	0	0	0	0	0
Mumps	1	0	13	0	37	0
Whooping-cough	3	0	4	0	4	0
Typhoid Fever	1	0	1	0	1	0
Undulant Fever	–	–	0	0	2	0
Poliomyelitis	1	0	0	0	0	0
Tuberculosis	69	11	58	12	31	–
Meningitis (Epidemic)	0	0	0	0	0	0
Erysipelas	2	0	5	0	3	0
Encephalitis Lethargica	0	0	0	0	0	0

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PROGRAMME OF THE 36th ANNUAL SESSION

GENERAL MEETINGS will be held on the first Tuesday of the month at 8 p.m.

CLINICAL MEETINGS will be held on the third Tuesday of the month at 8 p.m.

Place of meeting will appear on Agenda.

General Meetings will conform to the following order:
8:00 p.m.—Business as per Agenda.
9:00 p.m.—Paper of Evening.

1933.

November 7th—GENERAL MEETING.

Paper:
Dr. F. Brodie: "Brain Injuries."

November 21st—CLINICAL MEETING.

December 5th—GENERAL MEETING.

Paper:
Dr. C. E. Brown: "Disturbances of Gastric Secretion."

December 19th—CLINICAL MEETING.

1934.

January 9th—GENERAL MEETING.

Paper:
Dr. Lyon Appleby "Some Points in Surgery of the Spleen."

January 16th—CLINICAL MEETING.

February 6th—GENERAL MEETING.

Paper:
Dr. B. D. Gillies: (subject to be announced later.)

February 20th—CLINICAL MEETING.

March 6th—GENERAL MEETING.

The OSLER Lecture.

March 20th—CLINICAL MEETING.

April 3rd—GENERAL MEETING.

Papers:
Dr. Murray Baird: "Erythema Nodosum in Relation to Tuberculosis."
Dr. D. E. H. Cleveland: "Drug Eruptions."

April 17th—CLINICAL MEETING.

April 24th—ANNUAL MEETING.

EDITOR'S PAGE

We publish in this number certain correspondence between Dr. Routley and the B. C. Medical Association relative to an interview held with Mr. R. B. Bennett, Prime Minister of Canada. Our readers will, no doubt, form their own conclusions on this matter. We feel that an advance has been made, in that Mr. Bennett has at least admitted the justice of our cause, but the extent of the advance reminds one of the bulletins which appeared daily from the battle front during the Great War, when "important gains" were announced. The actual details always seemed rather an anti-climax.

And so it is with this. Our cause is just, but it is a case, apparently, where virtue is its own reward, and that is expected to be sufficient.

Dr. Routley appears somewhat more optimistic than we can at present justify his being. Nowhere does Mr. Bennett actually commit himself. He passes the buck back to the provinces. These are absolutely (at least in the case of the Western provinces) on their uppers, and will not contribute anything that they are not forced to give. So the prospect is not any too bright, unless we can find some other solution.

What are we to do in this emergency? Are we to be forced into the position where we must simply refuse to go on treating these unfortunate people? Suppose we did so refuse. That would, perhaps, force the issue, and might perhaps raise enough of a row to induce the authorities to find some money somewhere. It is a possibility, and we may yet be forced to it, if conditions persist as they are, or grow worse. But it will not be a solution. Even if some immediate financial result were obtained, it would not be a solution, it would leave much bitterness, and, like all wars, this conflict would leave a great many sore wounds in its train.

Moreover, it would have another prejudicial consequence, it would establish standards of remuneration on entirely false bases, and these standards would undoubtedly be used to our disadvantage in future negotiations.

Would it not be wiser to put the question to ourselves, whether the time is not now ripe for us to formulate an adequate and comprehensive scheme of medical care for the community, a scheme which would be not only fair to ourselves, but generous and profitable to the whole population?

Expediency is never a safe guide, it is always accompanied by shadows of retribution. Consider the British Health Insurance Act, which took the easiest and opportunist course, instead of being designed on sound economic lines: during its operation vested interests have grown up and become entrenched, which make improvement well nigh impossible.

For good or evil the feet of our civilization are set on the path that leads to socialization of every department of life. For ourselves, we are frank to say that we think it is for good. But we must not halt and linger on the way, looking continually over our shoulders, in fear that we may have made a mistake. The words of Jesus, the Son of Sirach, the Preacher of Wisdom, are still true, and may well serve as our guide,

"Do nothing without counsel
And when thou hast once done, repent not."

What scheme then should we urge? Health Insurance? Of late, a grave doubt has been growing in some of our minds whether even this would go far enough, or would solve all the difficulties. Also, we may question whether it is a sufficiently generous plan, whether, perhaps, we have gone far enough in considering the needs of the public, or whether we have thought too much of safeguarding our own rights. We do not imply that the latter is not fair and desirable, but we would emphasize the fact that our interetsts and those of the public we serve are inseparable and that candor and generosity on our part will do more than anything else to restore the medical profession to the pinnacle on which it once stood, and from which to a great extent, as a profession, it has slipped.

NEWS AND NOTES

Dr. W. E. Harrison has left for three months, to do post-graduate work in Eastern centres.

* * *

We extend to Dr. Bruce McEwen, of New Westminster, our sincere sympathy in his recent accident, especially as this caused such serious injury to Mrs. McEwen. Latest reports are that they are doing well.

* * *

Dr. Cyril Wallace, of the Solarium, V. I., is very ill at the time of writing, with a serious cellulitis of the arm. We hope for a speedy recovery for him.

* * *

Dr. A. J. McLachlan, who recently was quite ill following tonsillectomy, has gone for a much needed holiday.

* * *

Dr. J. W. Arbuckle has been holidaying at Vernon.

* * *

The tablet commemorating Dr. A. S. Monro's generous gift to the University of British Columbia was unveiled in the University Library, on Friday, October 20th.

* * *

Dr. Lavell Leeson, we regret greatly to say, has been seriously ill, following an appendectomy, but is now making a good recovery.

* * *

The two following letters are self-explanatory and are published for the information of our readers.

Vancouver, September 8th, 1933.

The Secretary,
King County Medical Society,
Seattle, Wash.

Dear Doctor:

According to an item in a local paper, "Dr. C. P. Bryant, M.D., of Seattle, gave an address, illustrated by diagrams, in diagnosis of cases" before the Convention of the B. C. Chiropractic Association in Vancouver on September 3rd.

Might we enquire if Dr. C. P. Bryant is a medical practitioner of good repute and in good standing as a member of the King County Medical Society?

Yours truly,
D. E. H. Cleveland, M.D.
Chairman Publicity and Educational Committee.

King County Medical Society,
Seattle, Washington,
September 6, 1933.

Dr. D. E. H. Cleveland,
Chm., Publicity and Educational Committee,
203 Medical Dental Building,
Vancouver, B. C.

Dear Dr. Cleveland:

Replying to your inquiry, re Dr. C. P. Bryant. Dr. Bryant is a graduate of the Jefferson Medical College, of Philadelphia, 1905. He was licensed to practice medicine in this State in 1908.

Information furnished this office regarding him, however, is to the effect that he says although he is a medical man he prefers to be rated with chiropractors. He is a user of the Abrams' machine and also the Coke (Koch?) cancer cure. He is reported to this office to be a man of very low character, "a cult quack, and against vaccination." His office is in a building occupied almost exclusively by charlatans and people of questionable standing.

Dr. Bryant, it is perhaps needless to state, is not a member of this society and could not be.

Very truly yours,
King County Medical Society,
Alice C. Stotlar,
Executive Secretary.

* * *

The attention of our readers is directed to pages 1229-1231 of the Journal of the American Medical Association of October 14th, 1933, in which a very full report appears on "Roman meal", together with reasons for refusing its admission to the "Accepted Foods." Such information should be of value in answering the queries of patients with regard to this product, for which elaborate claims are being made.

* * *

GENERAL MEETING

The first meeting of the winter session of the Vancouver Medical Association, 1933-1934, was held in the Auditorium of the Medical Dental Building, on Tuesday, October 3rd, with Dr. W. L. Pedlow, President, in the Chair.

The minutes of the Annual meeting held in April last were read and also the minutes of two special meetings held during the summer.

Dr. C. H. Vrooman made in interim report of the work of the Committee for the Provision of Medical Care during the past few months. He outlined the arrangements come to with the City of Vancouver for the payment of maternity cases and also referred to his interviews with the Aldermen, re the City Professional Tax, and advised members to state their views in writing to the Licence Inspector. He added that he did not anticipate any improvement in the matter of payment for general relief work this year.

Dr. Brodie spoke of the loss sustained by the Association in the passing of Dr. V. E. D. Casselman and moved the following resolution:

> "That this Association goes on record as expressing its deep feeling and sense of loss in Dr. Casselman's passing, and that a suitable letter be inscribed by the Secretary and sent to his

widow expressing these feelings and that this resolution be included in the Minutes."

and at the request of the President the members stood for a minute's silence in memory of their deceased colleague.

Two new members, Dr. J. E. Walker and Dr. J. W. Arbuckle, were elected to the Committee of the Summer School, for a three year term.

The address of the evening was given by Dr. E. L. Garner, whose paper on "Fractures" is abstracted in this issue of the Bulletin.

* * *

THE CLINICAL SECTION

The first meeting of the Clinical Section for the season was held in the Auditorium of the Vancouver General Hospital, on October 17th, 1933. The audience, at first small, was gradually increased by stragglers as time went on, a phenomenon possibly due to the inclement weather, possibly to good dinners.

Dr. Neilson, who presented the first case to somewhat somnolent listeners, produced as Exhibit A the gangrenous hand of an unfortunate woman who had suffered from mitral stenosis with fibrillation. An amputation had been performed through the upper arm, nine days after an embolus had lodged in the brachial artery. The doctor then reviewed briefly the present day indications for and technique of embolectomy, stating that a first consideration is the general condition of the patient. The audience did not rouse itself sufficiently to make any comments.

Dr. Burke, who had caused quite a sensation by arriving on crutches, then hobbled to the front to present his case. It was that of a young man with a large right arm covered with varicose veins, a pulsatile swelling under the right clavicle and a loud murmur which could be heard as far down as the palm. It developed that he had been shot through the right shoulder in 1928, and Dr. Whitelaw, who showed X-ray films, gave an ingenious explanation of the way in which the bullet had managed to wound both the axillary vein and artery, producing an arterio-venous aneurysm. The patient was at once completely surrounded while Dr. Burke, standing on one leg, drew diagrams on the board and gave a comprehensive outline of surgical procedures in such cases, developed chiefly by Matas. The audience took all this lying down, though someone was heard to mutter, "Why not the subclavian?"

Dr. Vrooman then showed X-ray films of seven cases of spontaneous pneumo-thorax, two of them post-operative. He pointed out that only one of these patients had developed tuberculosis, and thought that where the X-ray showed no disease in the lungs such cases should be treated as potentially tuberculous only, and watched for at least a year. Dr. Barker introduced an almost contentious note by stating that he would be very careful before pronouncing these cases free of tubercle.

Dr. Bagnall then showed a patient who had lived in the Belgian Congo and who complained of indigestion, swelling of the ankles and abdomen and jaundice, which he thought lasted for six or seven years.

He had had typhoid, malaria, and two kinds of tape-worms. There were scars of old ulcers on his legs, but the Kahn was definitely negative. Dr. Bagnall thought this was a case of slow toxic cirrhosis of the liver, and described his treatment with Salyrgan and paracentesis. Apparently nobody could think of anything better, though Dr. Strong, hopefully, mentioned primary carcinoma.

Dr. DesBrisay reporated three cases of progressive exophthalmos following thyroidectomy for Graves' disease and showed two of them, outlining very fully the problem presented by these cases. Something seemed to rouse the audience from its lethargy at this stage, possibly it was only the disappearance of the effects of dinner. Dr. Riggs described his experience with similar cases, and was not very hopeful. Dr. Irlma Kennedy remarked with some acerbity that neither of the cases shown was of the thyroid type, and intimated that more cogitation by the medical man before operation might have resulted in more benefit to the patients (possibly a just criticism). Dr. Keith inclined to Plummer's view of a "third substance" producing exophthalmos in these cases and Dr. Ainley dealt with the local conditions arising in the orbit.

It was felt that, given a little more time, a real argument might have been started, but at this point the meeting adjourned for coffee and sandwiches. The excellence of the papers presented was attested by the fact that no member even mentioned the unusual lateness of the hour.

* * *

MEDICAL RELIEF

Dr. T. C. Routley, in a letter dated October 10th, writes as follows:

"On Friday, October 6th, a delegation from the Canadian Medical Association was received by the Prime Minister of Canada, the purpose being to discuss the question of medical care of unemployed persons and their dependents throughout Canada. Our representations were made in the form of a document, as per copy herewith enclosed. Each member of the delegation spoke briefly to the petition. At the close of the conference, the delegation jointly set out their understanding of it, as per copy herewith enclosed.

The position of the Prime Minister of Canada in the matter might be epitomized as follows:

1. Medical relief to the unemployed and their dependents must be available.
2. The doctor must not be asked to carry the load.
3. It is strictly the obligation of the provincial government to provide the necessary care, and each province will be very specifically reminded of this by the Prime Minister.
4. Any province which pays for this care and then can prove to to the Federal Government that the burden is too heavy to carry, may expect money in aid from the Federal Government.

In the opinion of your delegation, the conference was exceedingly worth while and we now feel that the air has been cleared and confusion in the matter can no longer be said to exist. It is strictly the business of each provincial government to get busy and do the correct thing under the circumstances.

If there is any further counsel or advice or information which you require, please do not hesitate to write us. We are most anxious to assist in any way within our power. I shall be glad to be advised from time to time what progress is being made in your Province in working out any scheme which the Medical Association may think necessary and desirable.

The following constituted the delegation from the C.M.A.:

Dr. G. A. B. Addy, Saint John, President, C.M.A.
Dr. L. Gerin-Lajoie, Montreal, Repres. Quebec.
Dr. F. C. Neal, Peterboro, Pres. Ont. Med. Assn.
Dr. E. S. Moorhead, Winnipeg, Repres. Manitoba Med. Assoc.
Dr. D. S. Johnstone, Regina, Repres. Saskatchewan Med. Assoc.
Dr. T. C. Routley, Toronto, Gen. Sec. C.M.A.

The delegation presented to the Prime Minister a document setting forth their position (see copy attached). Each member of the delegation spoke to the petition. The Prime Minister replying made the following observations and statements:

1. While I have every sympathy with the point of view you have expressed you really have no contact with me; the matters you have presented are strictly the business of the provinces.

2. I am fully aware of the necessity of proper medical care being provided all people on relief but must insist that this is an obligation resting upon each Provincial Government.

3. I am in entire accord with the argument that the medical profession should not be asked to carry the load of providing the necessary medical relief.

4. I shall advise each province that it should undertake to provide medical care, to pay costs of same and in the event of the province doing this and submitting its cost figures to the Federal Government, sympathetic consideration will be given by the Federal Government to sharing the cost of such medical care according to the merits of the case presented by the province.

In the opinion of some members of the delegation, Mr. Bennett implied that the Federal Government would pay part of the cost of medical care where it was shown by a Province that it couldn't afford to pay the cost.

Seeing that various provinces have different needs, he would not tie himself to assist by any percentage or proportion of the funds expended.

5. The Prime Minister advised the Committee that the position of the Federal Government in the matter would be made very clear to each Provincial Government and further that the Canadian Medical Association would be advised as to what was being said to the provinces.

6. It was pointed out to the Prime Minister that the delegation was under the impression, after conversations with some of the Provincial Governments that the Federal Government had prohibited the utilization of Federal funds for medical care. The Prime Minister stated that the Federal Government had at no time forbidden the provinces to expend money for medical care but that the Federal Government had set

out specifically that they were supplying funds and had stated that these funds could be utilized in providing food, fuel, shelter and clothing. On the foregoing items, the Federal Government had committed itself to a definite proportion of the total cost, but the Federal Government is not prepared to commit itself to any proportion of the cost of medical care as a blanket policy covering the provinces as a whole. It should be repeated, however, that the Federal Government has no desire to see any province disregard its responsibility in respect to medical care, but, on the contrary, looks to each province to provide such care and if the province needs financial aid in respect to medical care, the Federal Government will not expect any province to carry the burden in this respect beyond reasonable limitations.

7. The interview lasted one hour. It was the consensus of opinion of the delegation that the Prime Minister of Canada shared completely our point of view with respect to the care of the people and the necessity of the doctor being paid, at least in part, for the services which he must render, but it is up to each province, through its constituted authorities, to discharge this obligation, both to the people and to the doctors and when this is done, to look to the Federal Government for such assistance as can be proven is needed by the area concerned.

* * *

FRACTURES

DR. E. L. GARNER, VANCOUVER

Dr. Garner gave at the outset of this paper a most complete review of the anatomy and physiology of bones, and dealt especially with fractures of the tibia and fibula of which he has a wide experience.

His paper proceeds with classification of fractures—(1) according to etiology; (2) as regards the varieties of fracture, as follows:

CAUSES AND VARIETIES OF FRACTURE

1. Spontaneous and pathological fractures; i.e., those cases which are due directly or indirectly to disease, general or local. These do not come within the scope of this paper.

2. Traumatic fractures. Predisposing causes, such as certain conditions of age, sex and occupation. These predisposing causes have less influence in our street accidents. The chief factor concerning us in this series of cases is that of the gainful occupations where work is arduous, and high powered machinery is in use, and here youth is the age of activity and consequent exposure to accidents, and the tibia and fibula the bones most frequently involved.

VARIETIES OF FRACTURES

1. In relation to external wounds, "closed" or simple are those in which there is no communication with the skin or mucous membranes. Those which communicate with skin mucous surface are called "open."

2. In relation to causative violence:

   (a) Traction fractures correspond with fractures from muscular violence.

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(b) Compression fractures are most common in the vertebral bodies.

(c) Flexion fractures are caused by a bone being bent over an object or by the two ends being driven towards each other, as in a fall on the feet. In these cases the fracture is either transverse or with a butterfly or half butterfly, i.e., a wedge.

(d) Torsion fracture, i.e., due to a twisting of the bone as the violence is applied.

3. In relation to the broken ends:

(a) Incomplete, "greensticks." There is also an incomplete fracture about the ankle in which a line of fracture may be discovered by X-ray in one lateral view and not in the opposite one, and also in one particular angle, and not in others.

(b) Impacted fracture.

(c) Complete fractures may be transverse, oblique, or spiral, also comminuted and butterfly. It is said to be complicated when the fracture is associated with an injury to some other important structure, such as an artery, nerve or joint.

4. Separation of the epiphysis may occur.

After a very full description of signs and symptoms of fracture, Dr. Garner goes on to say:

Complications

(a) *Immediate.*

1. Shock. This is important and will be referred to under Treatment.

2. Other Injuries. The fact that the patient has been subjected to violence must not be lost sight of, and therefore other injuries may be present; for example, injuries to the peroneal or other nerves, producing paralysis, fracture of the femur, its shaft or neck. Remember that one of the chief symptoms, say of fracture of the femur, or neck of the femur, without displacement, i.e., loss of function, is masked by a badly crushed tibia and fibula. Also if the violence is severe and not direct there may be a compression fracture of the vertebrae. So too, in injuries about the shoulder and upper arm, search for anaesthesias, and paralyses of the brachial plexus or musculo-spiral nerve should be found at the first examination before treatment is started, and before a plaster cast or other apparatus is applied. It is a great misfortune to find the paralysis after the cast comes off.

(b) *General.*

Infection may occur and produce osteomyelitis with death or a greatly prolonged convalescence. Embolism or thrombosis

may occur in the pulmonary artery or any of its branches. We have had two cases of embolism in the pulmonary artery, one in a branch leading to the lower portion of the lower left lobe, which produced sudden violent symptoms of pain, shock, dyspnoea, etc. These gradually improved, and the man got well. The other case was one in which the symptoms were more severe, and the man died two hours after their onset. In this case there was an acute tonsiluitis, and suppuration occurred in the soft parts about the fracture, and at autopsy, a large clot filled the pulmonary artery and its branches. In both cases the onset was about 10 days after the date of the accident.

(c) *Local.*

This consists in damage to the surrounding tissues. The most common and most important is the injury to the skin, making the fracture open. This is a most serious complication and its seriousness is proportionate to the time after exposure till treatment of the wound is begun. Another factor is whether the wound is one of protrusion or intrusion, the latter of course being much more serious in subsequent development of infection. There may be injury to joints, when if the fragments are displaced serious impairment of joint function may follow. In the case of the tibia and fibula there is seldom injury to nerves and blood vessels, chiefly because of this location between muscular bodies at a safe distance from the bones. The external popliteal or peroneal may be involved in cases of fracture of the neck of the fibula.

The diagnosis of a fracture is not always easy. As in other surgical or medical cases, it is very important carefully to secure an anamnesis. In this it is discovered if there has been violence which might affect the part. The essential point to learn is, if there has been sufficient violence which might produce a fracture. If so it must be presumed that a fracture is present. The history of recent loss of function is also important. The patient or his friends may make the statement that they heard disinctly a crack or snap, or crunching sound as of a breaking bone. This may often be taken with a grain of salt, but it will not be a mere tiny grain of wisdom exhibited if a radiograph is called for. Having concluded that there has been sufficient trauma to produce a fracture the procedure may be followed in regular order much as in the routine of a chest examination, with inspection, palpation, percussion and auscultation.

The *Roentgen ray* is the final arbiter in cases of suspected fracture, and should be used in all cases where any of the signs or symptoms are present. Particularly should this be done if there is even a suspicion that there has been violence sufficient to produce a fracture. This is true if the violence has been general, not merely local, e.g., if the patient has fallen or been hurled some distance. In such cases the vertebral bodies should be rayed for compression fracture. The radiograph should be taken in two directions, centred opposite the suspected site of the fracture, and the character of the fracture noted. Particular notice

should be taken of the lines of fracture if oblique, transverse, comminuted, etc., and a decision reached if the lines of fracture are such that, if completely replaced, the muscles and soft parts, with the aid of external fixation, will hold them there, i.e., if they are interlocking in type. It must not be forgotten that small cross fragments, interposed between the ends of the main fragments, may cause, even in a cast, the main fragments to become displaced. Occasionally it is necessary to take the X-ray in opposite directions and at times, especially about the ankle joint, it must be taken at different angles in order to get the line of the fracture. If this is not done and a slight fracture is present, especially if near a joint and the part is not put at rest, an intractable disability may result. An accurate knowledge of the character of the fracture, with the direction of the line of cleavage, is of the utmost importance. Also a history, if possible, of the fragments having been out and "put back" will assist in the treatment, because once the fragments have been out of normal position they may easily slip out again after the plaster cast has been most carefully and accurately applied.

Treatment

The open wound will be considered first, then treatment of the fracture proper alike in both closed and open. The wound of an open fracture should be treated surgically as early as possible after its occurrence. In more extensive wounds of protrusion, and particularly in all wounds of intrusion, the traumatized parts should be thoroughly exposed and all ragged and devitalized parts trimmed away, especially devitalized muscle, removing spicules of bone which are potentially infected, also removing portions of projecting ends of main fragments when potentially infected. Great care should be exercised in the search for and removal of foreign bodies. The wound should then be carefully Dakinized and the fracture reduced. Dakin tubes should be secured into the depths of all the pockets in order to flush the depth of the wound every two hours. The soft parts may be sutured in place or in very dirty cases left open. For the purpose of treatment, fractures of the tibia and fibula may be classified according to the degree of shock, the integrity of the local circulation, and the shape of the broken ends of the bone.

(a) *Shock.*

Those cases where shock is too great to admit of active treatment early. In these cases the wound must be properly dressed, the leg supported by sand bags or splints, and the patient treated for shock with external heat, blood transfusion, continuous intravenous or interstitial glucose and saline, morphine hypodermically, etc. This point is very important, shock must be sought for, the blood pressure watched and no trauma added to the shock already present, or one will, without much loss of blood, bleed one's patient to death into his own capillaries.

(b) *Extensive Damage to the Circulation.*

In cases in which contusion and swelling, ecchymoses, blebs, etc., are so great as to endanger the circulation of the extremity. Surgical care of the skin and rest and elevation of the leg on a pillow, or in a

box splint or between sand bags should be followed until the integrity of the circulation is assured.

Treatment of the Fracture Proper

(c) *Interlocking Type.*

Those in which the ends of the fracture are transverse or of such form and shape that they may become interlocked and retain their normal apposition to union without displacement and shortening, by the simple aid of splinting. These will include all cases of fracture even if oblique or comminuted, where there is no displacement, and where the history shows that there has been none.

1. The leg is placed upon a light modelled board splint, for alignment purposes, its outline having been secured by the pencil held vertically. It should be well padded, and extend from the heel to a point well above mid-thigh, upon which it may be easily held for confirmation of position of fragments by measurement, alignment, fluoroscope, or radiograph. When it is determined that the fragments are in normal apposition, the board splint is elevated upon small blocks or metal spikes which will support it at an angle of about 20 degrees from the table. This gives greater steadiness than the hands of assistants, and facilitates the application of the cast. A plaster cast is then applied from the ball of the foot to or above the mid-thigh. The plaster cast may be fenestrated or bivalved within 2 or 3 hours to permit inspection, treatment, massage, etc. This splint is retained in position with visual inspection, or X-ray, to check up from time to time, for a period of about 21 days, after which a light circular cast may be applied from the toes to the knee.

2. Those in which there is partial or complete displacement of the fragments. Where there is evidently displacement and angulation, one assistant should apply counter extension at the shoulders and then fix the upper fragment and the surgeon apply extension in the direction of the lower fragment, and when at the top of his pull, he should swing over and pull in direct line with the upper fragment, keeping the foot upward as regards the lower end of the femur and the patella. This should be taught as first aid treatment. The modelled board plaster cast splint is then used as described above.

(d) *Non-Interlocking Type.*

The non-interlocking type, the oblique, spiral oblique, and the comminuted, those types where shortening will surely occur, if mechanical means other than splints or plaster casts are not adopted, to maintain the healing process for about three weeks to a point in the repair process where there is no danger of any displacement. The temptation here is to rush into open operation, early after the accident, because one has the skill to do the operation well, and the equipment with which to do it, and feels the need of early reposition of the fragments. But the surgeon who does this reckons without his host, since traumatized tissues have poor resistance to infection, and so micro-organisms seize the favourable opportunity to make a good living, and increase in numbers, and the surgeon's reputation and his living are jeopardized. It is much safer

to wait a week or ten days, till the circulation is improved. Even in those cases of oblique, spiral oblique and comminuted fractures, where there is shortening and severe swelling and circulatory disturbances, skeletal traction should be applied early and the fragments brought as near to the normal anatomical position as soon as possible. For this purpose the writer has devised, and used for a number of years, a modified Bradford frame of iron tubing for the early application of skeletal traction by weights, and for its maintenance without disturbance till union is so far advanced that shortening cannot occur. The apparatus consist of a Bradford frame, a fracture-reduction setting-up frame, and a permanent frame. The Bradford frame has a number of nipples projecting upwards for the reception of the legs of the reduction frame. The latter has two prongs placed distally to the patient's foot, for the support of a cross bar and pulley. The permanent frame has corresponding prongs for the reception of the bar and pulley, and fixation at any level required. The patient is placed on the Bradford frame with the knee and thigh flexed, thus relaxing the calf muscles, thereby partially removing the most potent cause of shortening and angulation. The leg is so suspended by strips of bandage to a bar, above and parallel to the leg, that those attached to the thigh will act as counter extension, and those applied to the leg and ball of the foot will maintain the leg horizontally and the foot at right angles to the leg. Weights are then applied to the foot by means of a slit cotton bandage, using about 20 lbs. weight, if a man of moderate muscularity, and up to 32 or more lbs. for powerful men. It will take a little time for the muscle tonus to be overcome, then the adjustment and alignment and measurements are made. When satisfied that normal apposition has been secured the fluoroscope or radiograph is then used to confirm one's opinion. When satisfied with the reduction of the fracture one may apply the Delbet plaster cast which you all know. This cast is not universal in its application to fractures of the shaft of the tibia and fibula. As you know, it depends for its success on the markedly increasing size of the bones at the ankle and knee, where, after effective extension has restored the fragments to their normal alignment and apposition, snugly fitting rings of plaster are applied around the expanding portions of the bone at the knee and ankle, and these are kept apart by strong plaster straps or attelle on the sides of the leg. It is obvious that the safe applicability of the Delbet plaster is limited chiefly to fractures of the middle third. This cast must be watched if one wishes to avoid pressure troubles. If one has decided that the Delbet cast is not suitable, and believes that continuous extension should be employed, the patient should be placed on the modified Bradford frame, and the Kirschner pin, or the ice tongs should be applied to both malleoli or the Steineman pin passed above or through the os calcis. There is no need for a general anaesthetic if the ice tongs are used, as they are very simply and easily applied under a local anaesthetic, and the penetrating portions of the instruments wrapped and packed about with gauze saturated with alcohol. The setting up reduction frame is now placed over him and 20-30 lbs. applied, and the same procedure followed as in preparation for the Delbet plaster splint, except the fact that the tongs take place of the slit bandage. When the fragments are back to normal alignment and apposition, a supporting

circular plaster cast is applied from the toes to a point above the mid-thigh, using attelle to reinforce the posterior portion of the cast. The foot must be kept at right angles, but a soft ball pad should be the medium of pressure dorsalwards on the sole of the foot, rather than prolonged strain over the heads of the metatarsals, which weakens the arch for weight bearing. In other words the foot should be kept in the position of optimum function, as in the hand. When the cast is "set" one assistant lifts the leg and cast, and another releases the bar and pulley supporting the weight; and supports it while the surgeon cuts the bandage slings supporting the leg for the reduction process, and with a nurse, removes the setting-up reduction-frame, and replaces it by the permanent frame, placing it on the left if for the left leg, and on the right side of the Bradford frame, if the the right leg. The bar and pulley are then brought to the forks of the permanent frame, and the butterfly set screws applied to hold the bar and pulley at such height as will give extension in direct line with the shaft of the tibia. Towels are then pinned to the frame in such a way as to support the leg as in a hammock, just below the bars of the frame, giving a free uninterrupted view for fluoroscopic or radiographic study. In about 2 hours the cast is bivalved for observation, treatment, etc. An iron rod arch should be placed over the foot for the control of rotation. Lateral displacement may be troublesome in some cases and may be controlled by webbing straps placed suitably about leg and bar to draw the fragment into position. The extension is continued for about 21 days. Watchfulness must be exercised by measurements, the study of alignment, and even the X-ray may be used to check up on the extension, relation of fragments, angulation, etc. At the end of the extension period the tongs should be removed, the wounds dressed with alcohol pads, and a light plaster cast applied. The X-ray may reveal some angulation so that when the fresh circular cast is applied, the cast may be moulded in such a way as to remove the angulation. Another confirmatory X-ray should now be taken and if satisfactory, the cast is left on for about two weeks, then bivalved for massage and passive movement. It is important that the patient should, throughout the fixation treatment, actively exercise all the muscles of the foot, if possible while in the cast, as in Colles fractures, also massage and passive movement should be begun as early as possible. The writer prefers extension through the malleoli, so that the ankle may have, as early as possible, one daily movement in all four directions. For many years this has been his practice, in many joints in the body, whether lines of fracture lead into the joint or not, and the results are excellent. When the leg and foot come out of the cast a course of active exercises of the small muscles of the foot should be instituted and carried out to prepare the arches of the foot as well as the many tarsal joints for weight bearing; and this should come gradually, with measures taken to favour inversion of the foot, thus giving strength. Graduated exercises are most useful, giving the patient stated exercises with gradual increase in number, frequency, and vigour as the days go by. It is true that normal use of the leg is the best means of restoring the function of a part. Arthritis of knee or ankle or tarsal joints is the bane of the fracture surgeon. The writer believes that next to infection, prolonged fixation without the slightest movement, is respon-

sible for more adhesions and stiff joints than any other cause. Having a fracture of the tibia and fibula put up early in this way, the surgeon will face with confidence any complication such as increased swelling, open wounds, infection, osteomylitis, etc. He may bivalve or fenestrate the cast at any point to facilitate irrigations, dressings, and drainage, according to the character and location of he infection, and be assured that displacement, angulation and shortening will not occur. Infection does not prevent the formation of callus and ossification, and nature's attempt at osseous union is continuous. Therefore the fragments should be held in good apposition for the first few weeks during infection as well as in the absence of infection, in order to avoid shortening and deformity. In cases of extensive, infected wounds, the cast may be interrupted and the gap bridged by arches of narrow metal strips with their broadened ends encased in the plaster. These are useful later in the case of prolonged infections, but cannot take the place of skeletal traction during the first three to five weeks after the trauma.

During the use of extension in this frame, if the cast needs renewal because of operation, incision, drainage, etc., the process may be easily reversed, the setting-up frame used again, the operation performed, the new cast applied, and the permanent frame replaced. The extension has not been disturbed in the least.

Delayed Union.

This should be treated by a walking cast allowing the patient to bear some weight on the leg. If after five or six months there is still no union, the case should be considered one of non-union. Non-union is best treated by the sliding inlay graft, or the graft may be simply reversed or it may be necessary to take the inlay graft from the other tibia. The fractured ununited ends should be freshened and spicules of bone packed in the interspace to stimulate ossification. There was no case of infection from the open operation for inlay graft or other purposes, where no metal was buried.

Malunion.

Malunion must be prevented by early continuous extension, eternal vigilance in checking conditions by measurements, study of alignment and X-ray if necessary. Displacement of say, 50% may be tolerated, but angulation or rotation must not be allowed to continue. Shortening should be treated by the open method severing the improperly united fragments suitably, with a chisel, closing the wound and applying extension. Later when suitable length is attained, another open operation may be done, the ends freshened, an inlay graft applied, and the wound closed.

End Results in 47 Cases

In a study made by the writer some time ago of 501 cases of fracure of all kinds, in his private practice in the coal mining and logging industries, it was found that the great majority of fractures were in the tibia and fibula, the figures being 55 of the tibia and fibula together,

27 of the tibia alone, and 28 of the fibula, a total of 110 in grand total of 501 cases of all fractures. At this time a critical study will be made of forty-seven consecutive cases of fracture of the shaft of the tibia and fibula, occurring in the writer's private practice, some of them being referred cases, and a few showing a marked paucity of detail. The left tibia was broken in 54% of the cases, while in the right the percentage was 46. The fracture occurred in the upper third in 7%; middle third 31%; while in the lower third the percentage rose to 62%. No doubt the factors are the weakness of the bone at or below the junction of the middle and lower thirds, the fact that the foot is more or less fixed on the ground, and the influence of gravity upon missiles and flying objects both in leaving the ground and in returning to it.

Direct violence was the cause in 68% of the cases, while indirect violence produced 32% of the cases. In the case of the closed fracture, there were 66% and of the open, 34% of them interlocking and 63% of the non-interlocking type. Direct violence produced all of the oblique fractures. Case No. 12 had severe direct violence applied just below the tibial tubercle, where a transverse fracture was produced, while in the lower third, where indirect violence would be in effect, an oblique fracture was found. In the oblique fractures, the direction of the obliquity in the tibia leads towards the fracture in the fibula. The spiral oblique fracture of the tibia, due to indirect violence with torsion is commonly caused by the workman falling with a rotary motion, and alighting on one foot, which becomes fixed. The fracture is usually in the lower third, and the fibula is twisted off near its upper extremity.

Of the open fractures, 68% did not become infected. One of the earlier ones, Case No. 10, was an open fracture, potentially infected; the plate required removal on the forty-fourth post-operative day, because of infection, yet it held the fragments in normal apposition with no shortening, no angulation, and the case emerged with 337 days time loss and 15% impairment as at the knee. Case No. 8, another early case, referred three months after the crushing accident, had marked infection, had no extension, had two and one-half inches shortening, and a prolonged convalescence of 634 days, with 75% impairment of the leg as at the knee. Case No. 29 had no surgical treatment for eight hours after the open fracture was produced, and developed infection with osteomyelitis. It, however, had tongs and pipe frame extension, and had a convalescent time loss of 572 days, no shortening and 30% impairment as at the knee, a decided improvement over the previous case, which is comparable.

Of the closed fractures 81% had no infection. Case No. 21 had an embolus of a branch of the left pulmonary artery with recovery and no infection. Among the earlier ones, four were plated, and had mild infection, requiring removal of the plate. One case, No. 6, had no operation, but the projecting lower end of the upper fragment came nearly through the skin, and although the parts were treated surgically, the bone became infected. Another, No. 12, developed tonsillitis infection about the fracture, extensive thromboses in the pulmonary artery, and death resulted in two hours.

Of the seven cases where the metal plates were used, all but one have had the plate removed. This one, Case No. 2, has had the plate on his tibia for over fourteen and one-half years; and his physician, Dr. B. Asselstine, of Fernie, B. C., who has kindly reported his patient's present condition, states that "the workman still has the plate on his bone, that if working in cold weather, he feels it and that he talks of having it removed." Of the remaining six, all have had the plate removed. Four of them had mild infection, and the records do not give the reason for the removal, in the case of the remaining two, yet it is quite evident that they were giving trouble. Since these early cases, the writer has not buried any metal in this work. The average number of days the plates were left in was 65. The average time loss was 291 days. There was only one case with a permanent partial disability, and this on only 15% was at the junction of the upper and middle third of the tibia.

Interlocking Type.

In four of the earlier cases splints were used and the average time loss was 184 days, with no permanent partial disability. Seven of them had plaster casts applied with an average of 181 days time loss and no permanent partial disability. One, No. 12, died of thrombosis of the pulmonary artery following tonsillitis and suppuration in the contused tissues.

Non-Interlocking Type.

Those treated by metal plates have been reported. Case No. 14, referred four months after the accident, had a double oblique open fracture of the tibia with malunion and one inch shortening. One of the fractures revealed nonunion, and had three inlay graft operations by different surgeons; no infection; with 601 days time loss and a permanent partial disability of 50% as at the knee. Case No. 16, referred three months after the accident, an oblique fracture treated by splints, had two inch shortening, bad alignment, then had open operation with curetting of the ends of the bone and an improvement in the alignment; had no infection, time loss of 442 days, and a permanent partial disability of 25% impairment as at the knee, with no improvement in the length and much arthritis of the ankle. A report from this man a few weeks ago states that "he has had a great deal of trouble, swelling and stiffness."

Use of Author's Pipe Frame.

The number of cases in which the pipe frame was used was fifteen. Two of them had glue extension. Of the remaining thirteen, one case, No. 47, was a comminuted spiral oblique fracture of the lower end of the tibia with much displacement. The end result was good function with some shortening due to difficulty in getting the fragments back into normal position and delay in union. Of the remaining twelve, three were complicated, viz: Case No. 26 developed acute mania during the treatment, and was sent home to China with an estimated time loss

through nonunion, of 587 days. Case No. 29, an open fracture exposed over eight hours without surgical treatment, developed infection with a time loss of 572 days, and a permanent partial disability of 30% impairment as at the knee. Case No. 30 had an open fracture of the tibia and fibula, an open fracture of the femur and a fracture dislocation of the same knee, with a time loss of 583 days, and 35% impairment as at the knee. Of the remaining twelve cases, the average time loss was 261 days, and of these only one had permanent partial disability, i.e., Case No. 27 had 10% impairment due to arthritis at ankle and knee, probably due to delayed union and prolonged fixation. The remaining eleven had no shortening, no permanent partial disability. Cases No. 18, No. 20, No. 21, No. 22, No. 32, and No. 36 have been traced to from 5-7 years and are without any symptoms or disability, and with free function of all the joints of the leg and foot. This is in marked contrast to cases reported where shortening or angulation was allowed to continue or where infection could not be prevented.

There was no case of infection from the use of the tongs or pins.

The use of the tongs for extension in these cases was continued for an average number of 22 days.

This frame, with some pipe attachments, has also been used many times for extension and adjustment, in fractures of the femur and vertebrae. It has proven itself invaluable in small hospitals.

Conclusion and Summary

1. Careful search at first examination for other trauma, such as paralyses or other fractures.
2. Avoid increasing the shock.
3. Of the causes which most prolong convalescence and produce the greatest degree of disability, the chief is infection. Next would come imperfect reduction of the fracture, leaving angulation, rotation, or shortening, all of which can be avoided by the use of skeletal traction. Thirdly, over-extension, prolonged extension, or prolonged fixation, often due to delay in reduction of the fragments with consequent disturbance of the osseous reparative process.
4. Prompt thorough surgical attention to all wounds of the skin.
5. Complete early anatomical reposition of the fragments, or at least such as will give good function, i.e., the axes of the fragments parallel, and the knee and ankle joint parallel.
6. Fix the foot at right angles with the leg, with the foot slightly inverted and the arch supported.
7. Massage and passive movement should be begun as early as possible.
8. Care must be taken to protect the foot on first beginning to bear weight.

Having now taken the different cases through to convalescence, it is here one begins to taste some of the fruits of his labours. It may be bitter, it may be just plain flat, or it may be sweet, much as is the reward of the orcharist who has been wise and thoughtful, vigilant, industrious and scientific in the choice and care of his soil, his trees, his fertilizer, his cultivation, his antiseptic sprays. The more one knows and follows the biological ways of things, the sweeter will be the fruit of one's labours.

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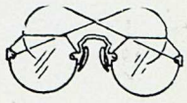

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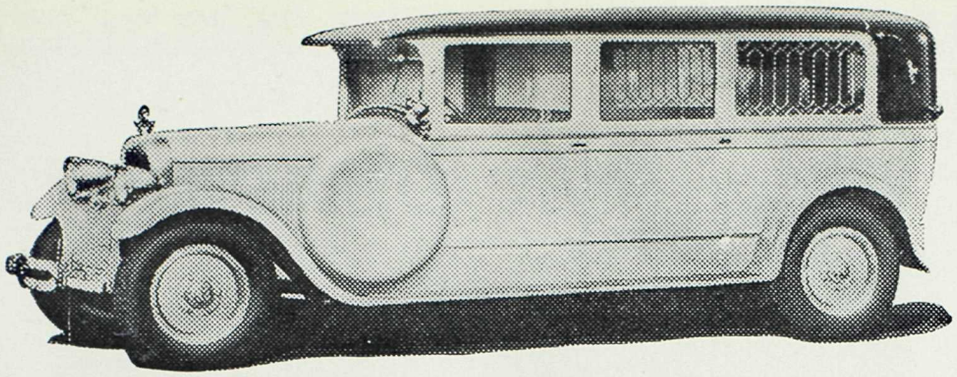

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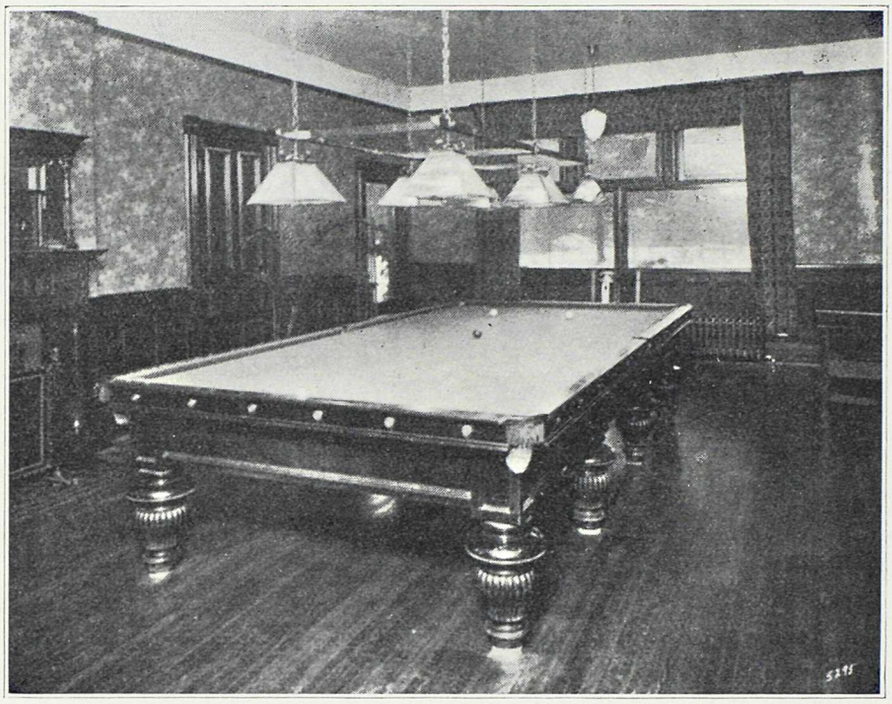

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