

office for examination. Shortly after placing the color skeins before them and having them sit down to watch the colors, the perspiration would roll off their faces, and they would appear to be very much frightened and often confused about the colors. Now, the boys that live in Omaha and who are acquainted with me, come to my office and pass the same examination without any trouble, without any sweating. Examinations with the color skeins are not a great success. In my own office I have a dark room in which I can test applicants with different colored lights. If an applicant fails with the colored skeins, I take him into the dark-room and use a flashlight, such as he would be required to use in his work, and I can then determine whether he is color-blind or not; whether he can distinguish green, red, blue, and white, as he should be able to do in his work. Many of the applicants for railway service that we at first suspect to be color-blind are not. After passing an examination in the dark-room, and the excitement has subsided, these applicants will match the skeins without much trouble. If I understood the Doctor correctly, he stated in his paper that the old employes were allowed to wear glasses for distance.

Dr. PRITCHARD—Yes, sir.

Dr. BRYANT—I think that is a mistake on the part of the company. If an employe has an error of refraction, if he has 2D. of hypermetropia, he is a much better man before he attains the age of 40 years than he is after that age. Before he attains 40 years of age his accommodation is good; he can overcome 1D or 2D. of hypermetropia and have good vision for distance. After this age he loses the power of accommodation, and his vision for distance becomes poorer and poorer.

Speaking of trainmen, I do not believe any man should be allowed to use glasses. If his vision is not good for distance, he should be given some other employment in the service. Of course, men who have been in the employ of railroad companies for years should be treated well. Reading orders is a different thing. An engineer can use his glasses for this purpose, and then remove them; at the same time, if the distant vision of an engineer is poor, not knowing how soon he may break his glasses, or how soon they may get frosted or dusty, it becomes poorer, and a wreck may result in consequence of it. Such men should be taken off the train service and put in some other branch. The rule of the railroad represented by Dr. Gardner, of not employing men for train service after they have reached the age of 45 years is better still.

In considering the question of hearing, I believe the watch test is the best of all for one portion of the test, but we should not stop with the watch test. The average watch tick gives us a high tone. Many applicants for positions in the railway service can hear high tones, but not low ones. Let them be thoroughly tested with the watch, the voice, and the tuning fork. I give them a fair range. I do not take every tone in the gamut; but you will find many men who hear high tones, but not low ones, and vice versa. This usually means that there is beginning trouble in the internal ear, and this is a serious matter. An applicant who is examined today and hears distinctly high pitched tones, in six months may be unfit to enter the railway service. Railway employes should be examined at least once a year, and should not be let go until some accident occurs, and then be re-examined. No employe should be considered to be perfect next year because he is this year. He should be examined yearly, especially as to sight and hearing.

Dr. D. S. FAIRCHILD of Clinton, Iowa—The limit of the Chicago & Northwestern road for men entering the train service is 27 years of age. The question which I raised in my previous remarks, and which Dr. Bryant partly answered, was with reference to men not hearing a watch tick at a certain distance who were under 27 years of age. We know that there are men engaged in machine shops and boiler shops who are accustomed to noises for a long time, and it is impossible for them to hear a watch tick, yet they can hear ordinary conversation well. I refer to men who are not exposed to such noises, who are under 27 years of age, but who may have a mild form of internal ear disease which may give rise to serious results later on.

There is one other point. The Northwestern Railroad Company has adopted a system of examining engineers over 50 years of age. As soon as a man reaches that age his eyes are examined. There are only a few of them whose eyes are normal. Occasionally an engineer will be found with vision of $\frac{20}{20}$ who is 50 years of age. If the vision of these men, after reaching this age, is below $\frac{20}{30}$, then they are required to wear glasses.

Soon after I undertook the examination of these men, and they began to wear glasses, they told me that at night they

could not see as well with glasses as they could in the day-time. Contrary to the instructions of the chief medical officer of the company, I advised the men to take off their glasses at night. After a while I had to wear glasses, and I had a practical demonstration of it myself. I always take off my glasses at night because I can not see as well. We can not discharge engineers over 50 years of age whose eyes are slightly defective. Those are the men who are usually in charge of our passenger trains. I am inclined to believe that we should make some allowance for these slight defects. We should consider the intellectual capacity of these men. We find men who will pass an excellent physical examination, yet who are intellectually incapable of taking the responsibilities of trainmen; and we find men who are slightly defective in vision, and are bright intellectually. I am inclined to stretch a point in the cases of such men. Their intellectual caliber makes them valuable, and they are better able to assume responsibility. They make better men than those whose eyesight is perfect, but who are intellectually inferior.

Dr. R. HARVEY REED of Rock Springs, Wyo.—I am very glad I have been here this morning to listen to this interesting discussion and the instructive paper. The question of physical examinations of railroad employes has been discussed more or less by the different roads of the East, but to the best of my knowledge with no such thoroughness as it has been by western men. It is a subject which should interest the management of every railroad, because it is a protection not only to the employe, but to the passenger and the company.

The service inaugurated by Dr. Gardner on the Southern Pacific road is a practical innovation, and I think every trunk line ought to have most carefully selected employes, and such as we only get by careful examinations, as has been suggested by the author of the paper, and by those who have participated in the discussion. I think it is an innovation which should be pursued by the management of railroads in such a way that they will realize the benefits of it, and if our discussions in this Academy accomplish this one thing only, the year will have been profitable.

Dr. PRITCHARD (closing the discussion)—I feel very much gratified to have had this subject so thoroughly discussed, and have but little to note in my closing remarks. As Dr. Fairchild has told us, the C. & N. W. vision standard is $\frac{20}{20}$ for new men under all circumstances. As to the watch test, there is nothing more practical in my opinion. We can not furnish tuning-forks. If we do that, they must be of one pitch. The watch test, with ordinary conversation at twenty feet, will cover the question of hearing in a practical way, and there is very little more needed.

One of the speakers referred to passing a man with flat-foot. Any man who would pass an applicant with flat-foot ought not to be an examiner for a single moment.

There is one point that has occurred to my mind very often, and probably to the rest of you, and that is, that there should be a standard as to colored lights. Railroads oftentimes have all shades of red, from a dark to a bright red, in use at one time. I have had men select colors according to intensity, and this was the only way by which they could understand signals at all. I had one peculiar case quite recently. A man was referred to me for examination who had been a station agent for about fifteen or eighteen years. He turned his red light after the train had passed, went home and left it, and stopped all trains for that night. The question of distinguishing colors came up, and he was referred to me for examination. I found him so near-sighted that he could not see anything at two inches from him, and could not even be fitted with glasses to improve his vision. Such men need to be weeded out of the railway service.

A very important point is to see that all reports are sent to a competent surgeon to check over before they go to the operating department. When this is not done, great confusion results.

FRACTURE OF PATELLA.

Read before the Fifth Annual Meeting of the American Academy of Railway Surgeons, held at Chicago, Oct. 5-7, 1898.

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Fractures of the patella are not of frequent occurrence; they constitute about 2 per cent. of all fractures, and are found more frequently in the male than in the female—in the proportion of about five to one. Fractures of this bone demand careful consideration,

on account of its close proximity to the knee-joint, and also in consequence of the imperfect way in which the fragments unite; fracture of the patella is caused by muscular action or direct violence. The direction of the fracture may be transverse, vertical, oblique or even stellate. In the fracture produced by sudden and violent muscular contraction, the transverse variety usually occurs; when the fracture is caused by direct violence, the direction may be vertical, transverse, oblique or stellate, or the fracture may be comminuted. In fracture of the patella the knee-joint is always opened, unless the extreme lower end of the patella is broken, in which case it is possible for the fracture to exist without the joint involvement. In most fractures of the patella there is not only opening of the knee-joint, but the fracture has also associated with it a tearing of the aponeurotic and fibrous coverings of the bone, as well as a laceration of the synovial membrane of the joint, and a rupture of the prepatellar bursa; in consequence of the peculiar nature of this injury the joint is soon filled with blood, and the synovial secretion becomes abundant. The signs of fracture of the patella vary somewhat, according to the manner in which the injury occurred. Crepitus is generally absent in this fracture, on account of the separation of and the intervention of fibrous tissue and blood-clots between the fragments, the patella is lengthened with a well-marked sulcus, with ecchymosis, and swelling rapidly, appearing with a loss of the general contour of the joint. The usual mode of union, to which, of course, there are exceptions, by the older methods of treatment, is not osseous, but ligamentous or fibrous, with separation of the fragments; many ingenious and complicated devices have been invented by surgeons of reputation, all striving to accomplish the same object—to bring the fragments together and retain them in apposition until united—but almost without exception the union was fibrous, with separation of the fragments.

If by any device externally applied the fragments could have been kept in apposition, with our present knowledge of antiseptic surgery it would not have been up-to-date surgical treatment. The extravasated blood should be removed from the joint; that, with the lacerated aponeurotic fibrous tissue between the fragments, would prevent bony union. In some cases it was possible with some of the older devices to bring the fragments well together and retain them sufficiently fixed, yet the result was almost universal—non-union of bone. It was not position of the fragments alone that prevented union, but the condition of the joint filled with blood-fluid, with torn shreds of tissue between the fragments.

I believe that in every case of fracture of patella with extravasation of blood and fluid into the joint with rupture of the capsule—which is the case in almost every fracture of the patella by railroad injury—the joint should be opened and thoroughly cleansed antiseptically and the fragments then sutured together. Before any method is resorted to with a view of bringing the fragments into apposition, the surgeon must endeavor to control and modify the joint inflammation. For this purpose the usual treatment of cold application by ice-bag or cold irrigation is very generally resorted to; where there is a good deal of superficial ecchymosis, warm antiseptic fomentation is applied. You should never operate on fractured patella immediately after the injury has been received.

The object of the preparatory treatment having been attained, the question as to the method of operating will next claim the surgeon's attention; this should, to a certain extent depend upon the nature of the fracture, whether simple, comminuted or compound. Yet, when accompanied with the usual complication of hemorrhage and joint injury, the operative procedure should be the same in either case. Should the fracture be compound, the operation should be performed immediately after the accident. Every surgeon will recognize the necessity for strict antiseptic precaution before, during and after the operation; the slightest mistake or carelessness in the minutest detail of the operation may cost a limb, or even a life. At the present time very few, if any, surgeons resort to the various ingenious external devices (with which you are all familiar); but rather open the joint, thoroughly cleanse it, render it aseptic without a doubt, then suture the fragments together. There are several points to be carefully attended to during the operation, First, decide what material to use for sutures. Silver wire has been generally used for the past fifty years as the material most suitable for the permanent fixation of the fragments. When this mode of treatment has been resorted to, whatever the material used, it is with the view that it shall remain permanently. The results attained from the use of silver wire have generally been satisfactory, but in a few cases the result did not fill expectations, the wire acting as an irritant—suppuration and failure being the result.

For some years I have used chromicized catgut for sutures, and have always found it fulfilled every indication required as well as silver wire, and was free from all danger. The incision can be either longitudinal, transverse, crucial or semicircular. I favor the semicircular, with the opening to the outer side. The fragments and the joint are freely exposed, and all blood-clots from the joint, from the synovial pouch under the quadriceps muscles and from between the fragments are removed. The intervening tissue of the anterior fibrous capsule is elevated from between the fragments; the two fragments are refreshed by being scraped. The drill is now made to perforate the upper and lower fragments (care being taken to have the point of the drill emerge from the lower surface of the patella just above the lower cartilaginous surface). If silver wire is used when the fragments are in apposition, it is twisted, cut off and hammered down upon and into the tissues over the line of fracture, chromicized catgut being used, passing it through the drill holes of the upper and lower fragments; they are brought snugly together, the ligature is then tied. The aponeurotic fascia and soft tissues in front of the patella are nicely sutured, which procedure hermetically seals in twenty-four hours the front of the joint from any discharge infiltrating through the tissue made by the fracture from the soft parts over the front of the patella. All loose pieces of tissue are removed, and any torn or lacerated shreds are cut away. The semicircular flap of integument is now sutured and the line of incision is closed. The linear incision can be painted over with a layer of styptic collodion and then dusted over with iodoform, after which a posterior splint and other external dressings are applied in the usual manner.

The success of this operation depends wholly upon conscientiously carrying out the smallest details of antiseptic surgery.

DISCUSSION.

Dr. W. W. GRANT of Denver—The unequivocal statement of the essayist that all these cases can be treated by wiring the fragments demands consideration. While it is a fact that Lord Lister established the aseptic treatment of wiring the patella on a sound and enduring basis, I will say that I went through the wards with him in London eight or ten years ago and observed his cases, which he took great pains to explain in detail, and his practice was to use large silver wire. I never saw a case of suppuration, and always a good result. The probabilities are that he would not have the same results with the same treatment today. Yet it is a fact that the profession is not now agreed that it is wise to make a compound fracture of a simple fracture of the patella in order to wire it. As a matter of fact, the result of close ligamentous union is not bad; if the patient has not that bony substantial union that he would have by successful wiring. It must be remembered that, in spite of antiseptic precautions, infection sometimes gets into these wounds, and if such should be the case, there will not only be imperfect union but an ankylosed joint, and surgeons hesitate very much to convert simple fractures of the patella into compound ones. I do not believe such a recommendation would be safe for general adoption. It must be admitted, too, that if the case should fall into the hands of a skilled surgeon, who is always careful to carry out every aseptic precaution, the result will be gratifying, but this will often not be the case, and if it is once generally known as the ultimatum of the profession, that in cases of considerable effusion of blood into the joint the joint should be opened, the clots of débris turned out, and the fragments wired, we are going to have some bad results follow which will bring the operation into disrepute. There is no question but that in compound fracture of the patella, the patella should be wired at once. In those cases where we have considerable laceration of the soft parts, extreme distension, with effusion of blood, it is wise to open and turn out the blood clots; but in cases seen around the elbow-joint these can be dealt with very well by aspiration. At the present time it is hardly a safe dictum that we should convert simple fractures of the patella into compound ones for the purpose of wiring the fragments together, in order to get bony union, while under our present methods of treatment we can secure close ligamentous union with very good results.

Dr. FRED J. HODGES of Ashland, Wis.—The essayist failed to draw a distinction between those fractures produced by direct violence and those produced by muscular effort. It is well known that osseous union is practically unknown in those injuries which are produced by muscular action. This field of surgery was illumined by the work of Macewen, who in 1883 called attention to the fact that in fractures caused by muscular action, the posterior thick and elastic covering of the patella stretches before it gives way; that these fibrous bands are brought into apposition when the fracture is reduced, causing a heterogenous new tissue formation at the site of fracture, that is, fibrous tissue between the two bony surfaces. In such cases the main consideration is not so much the suturing or the method by which the fragments are approximated as it is the removal of this incarcerated fibrous material from between the fractured ends which is interfering with bony union. To become dogmatic and say that every such case should be operated upon, is going too far, as is shown by the course of the eminent authorities now in charge of the case of the Prince of Wales. He is under the care of Macewen, who practically originated suturing the patella, but is being treated by the older methods. There are certain conditions of the body of the royal patient which contraindicate his being treated along the operative line.

In fractures produced by direct violence there is comminution, but no stretching or incarceration of fibrous tissue, and in such cases we may reasonably expect firm bony union from any method which will bring the surfaces of bones into apposition. Intervening fibrous tissue must be removed if you seek bony union, and incarceration of tissue always occurs where the injury is the result of muscular action, which, of course, constitutes the great majority of such injuries. A body which would become authoritative in its field could hardly commit itself to the proposition that every case of patellar fracture should be operated upon, and to that extent I take exception to the paper.

Dr. W. J. MAYO of Rochester, Minn.—I was very much pleased and interested in Dr. Jay's paper. Dr. Hodges struck the keynote when he said that in those cases of fracture of the patella caused by indirect violence the difficulty in securing union is from the interposition of fibrous tissue between the broken fragments. Macewen gave us the reason why in some cases of fracture of the patella we had considerable separation of the fragments and still good functional use of the joint se-

cured. It is because that portion of the anterior ligament, of which the patella is but a part, is separated, while the lateral expansion of the tendon holds the joint in good position.

Another point to be considered is the best time for operation. The knee-joint is a good deal more dangerous than the peritoneal cavity, the reason for which is its liability to infection. In addition to that, it has not nearly the power of protecting itself that the peritoneal cavity has; it has not the lymphatic supply. If we get infection of the knee-joint, we may not only lose the joint but the patient's life. A slight infection of the peritoneal cavity would be harmless as compared with a similar infection of the knee-joint, for the reason that nature has not prepared that protection by which she provides a certain immunity from infection and traumatism in the peritoneal cavity. As to the time for operation, we will be governed largely by the condition of the skin. If the skin is not bruised we can operate at any time, but if it is bruised or covered with blisters, on account of the liability of carrying infection into the joint, surgical intervention should be delayed until a more favorable opportunity presents itself. In connection with operation, I do not think the finger should be allowed to touch the wound. Soiled fingers, which can not be avoided in the peritoneal cavity and are practically innocuous under ordinary circumstances, in the knee joint prove dangerous. The method of working entirely with instruments is good, sound surgical practice.

Dr. JAY (closing the discussion)—I do not know that I have anything in particular to say in my closing remarks. Probably most of you consider the paper a little radical. However, as I said in my paper, when there is a fracture of the patella, with pain in the joint, effusion of blood and synovial fluid in it, ecchymosis, etc., I have no hesitation in opening into the joint, cleaning out the débris, stitching the fragments together, believing that I will have a good result. I call it good surgery to do this. If the lower end of the patella is broken off, does not penetrate the joint, and there is no effusion of blood or of synovial fluid into the joint, there is no necessity for opening the joint. It is not good practice to let a knee-joint filled with extravasated fluid or blood with fibrous tissue incarcerated between the fragments go unoperated. By external applications you can not get the fragments together, nor would you get bony union in such a case if the fragments could be brought into apposition. The interposition of fibrous tissue or of other material between the broken bone certainly prevents you from bringing the fracture in apposition.

Dr. GRANT—What would you do in a case where there was no interposition of material between the fragments and there was simply effused blood?

Dr. JAY—You do not wait for the interposition of fibrous tissue. I have operated on fracture of the patella for the last fifteen years, and I have never had an unfavorable result. Before I had carried out the treatment I have described I had the fragments one and two inches apart, particularly in the cases of old men, and they needed a support all the time. I do not operate on every fracture of the patella where the knee-joint is opened, the aponeurotic structures are torn, and there is an effusion of blood. I have had three cases in the last six months in which the fractures were caused by external violence. These were railroad cases. In one case in particular, the fracture of the patella was caused by a railroad tie falling on the man's leg. I did not see him for five or six days after the injury, at which time the knee-joint measured twice what its fellow did. I could not tell definitely whether there was a fracture or not at that time. He was brought to the hospital, hot antiseptic fomentations were applied to reduce the swelling, and then an incision was made, through which a pint of clotted blood was turned out of the knee-joint. The cavity of the joint was irrigated with boracic acid and bichlorid, the tissues washed and re-washed until they were thoroughly cleansed, and the patella sutured. This treatment was followed by an excellent result in this case.

THE BACILLUS AEROPHILUS.

OCCURRENCE IN CHRONIC SUPPURATIVE OTITIS MEDIA.

Presented to the Section on Laryngology and Otology at the Forty-ninth Annual Meeting of the American Medical Association, held at Denver, Colo., June 7-10, 1898.

BY LEWIS S. SOMERS, M.D.

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Zaufal¹ states that a pure culture of any micro-organism is rarely found in the secretion of otitis media purulenta chronica, and as a rule, there is a variety of bacteria, particularly in neglected otorrhea,