VAN ARSDALE (W. W.)

SPRAINS:

A Report of Twelve Hundred and Thirty-one Recent Cases Treated by Massage at the Good Samaritan and Eastern Dispensaries.

IN THE SERVICE OF

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ADJUNCT PROFESSOR OF SURGERY IN THE NEW YORK POLYCLINIC; ATTENDING SURGEON TO THE GOOD SAMARITAN DISPENSARY; ASSISTANT SURGEON TO THE NEW YORK CANCER AND MOUNT SINAI HOSPITALS.

REPORTED BY

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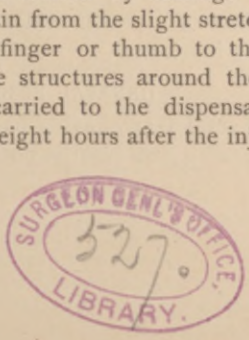
DURING the years from 1887 to 1894, inclusive, 3280 cases of sprains have come under the observation of the surgeons connected with the Good Samaritan and Eastern Dispensaries. The distribution of these is shown in the table on page 2. The first column gives the number of cases treated by massage in the hands of Professor Van Arsdale.

This list of cases treated by massage includes every degree of sprain from the slight stretching of the ligaments of a finger or thumb to the severe laceration of all the structures around the ankle, many cases being carried to the dispensary from twenty-four to forty-eight hours after the injury, the



limb distended to two or three times its normal dimensions, "black and blue" from extravasated blood, etc., and the patient suffering from excruciating pain.

Region.	Masséed.	Total cases under observation.
Ankle	487	1153
Wrist	198	641
Thumb and finger	222	586
Elbow	45	178
Muscles	108	145
Shoulder	51	161
Knee	55	146
Toes	6	114
Hip	37	68
Foot	10	49
Back	3	22
Neck	4	8
Clavicle-joint	1	5
Tendon	3	3
Rib-joint	1	1
Totals	1231	3280

Most of the patients have been of only an average degree of intelligence, of foreign birth, and not at all likely to carry out strictly any but the most simple directions. It has been customary to demonstrate to them by masséeing the injured member for ten minutes, telling them to do likewise for a half-hour every morning and evening, and insisting on the constant use of the limb. A mixture of equal parts of olive-oil and chloroform was given them as a lubricant.

GENERAL RESULTS.

For several years, having had ample opportunities for observing the results obtained by others, and

personally carrying out the splint-and-rest treatment of sprains in several of the largest dispensaries and hospitals in this city, it seems but just that the superior results secured by massage in so large a number of cases, with a lucid description of the *modus operandi*, be placed on record.

The best and quickest results are obtained in those cases in which treatment is begun immediately after the injury, and the sooner after injury massage is begun the shorter the time required for the complete restoration of full strength and vigor to the limb. At the same time neglected cases, or cases in which splints or any other means of immobilization have been used, will respond and give most satisfactory results.

IMMEDIATE EFFECT.

After a few minutes' massage of, say, a sprained ankle, the skin will become less tense, the limb paler, pain diminishes, and, as the rubbing continues, entirely disappears; the patient experiences a sense of ease and comfort that induces him to look forward to the next treatment with pleasure, and often to ask that the rubbing be repeated several times during the day.

In cases seen within about twelve hours after the injury, or before extravasation has occurred, if massage is begun at once, and kept up twice daily, the patient being urged to use the limb a half-hour after the first application, no accumulation of exudate and blood can occur, and the patient, therefore, cannot suffer from pain or loss of function from adhesions. Great stress must be laid on the use of the limb

after massage, as the muscular action aids the lymphatic and venous circulation.

When there has been much extravasation, with marked distention of the skin and consequent pain, it has been necessary in a few cases to use an anesthetic at the first sitting in order that the massage may be thoroughly carried out.

If the method to be described is faithfully carried out, at the end of the first treatment the limb can be moved without pain in any of its normal directions. This fact, with the appreciable relief and sense of comfort, encourages the patient to use the limb.

The time required to achieve a cure may be said to be reduced from weeks to a corresponding number of days. Further than this, there are no "stiffness and sense of weakness and pain" in the joint, so often complained of, but a complete restoration of the normal functions of the limb.

In presenting this subject it is proposed to give :

1. The opinion and results of other workers in this field.
2. The results of experimental evidence.
3. A summary of the pathologic changes in joints following sprains.
4. The physiologic effects of massage as applied to sprains.
5. Van Arsdale's method, described by himself.
6. Indications—use in diagnosis of fractures.
7. Contra-indications.
8. Summary.
9. References.

D. Graham[1] asks, "Supposing that any one wanted to make a well joint stiff, to what more effectual means could he resort than to give it first a wrench or sprain, then do it up in a fixed dressing, so that the resulting inflammation would have an opportunity to produce adhesion of tissues?" He further emphatically announces that "the sooner massage is used after a sprain the more speedy is the recovery, and the more quickly are heat, pain, and swelling reduced, and the formation of adhesions prevented. Comfort generally follows the first treatment."

In his monograph on railway injuries H. W. Page[2] has struck the keynote when he says, "I am altogether opposed to the treatment of these spinal sprains by the application of spinal jackets. They merely postpone to another day the treatment which will have to be carried out, and they moreover tend to increase the rigidity and make the ultimate treatment more wearisome and difficult."

In a paper on the "Use and Abuse of Passive Motion," read before the New York Surgical Society, Dr. Henry B. Sands,[3] speaks of the excellent effects from the use of massage and passive motion in recent sprains of mild degree. He further calls attention to the necessity of passive motion to prevent or remove stiffness or pain after one or two weeks' rest and immobilization, and to the liability of a sprained ankle (treated after the latter method) to be followed by a long-continued lameness and pain for a considerable or, it may be, an indefinite period, while in a still smaller number the founda-

tion is laid of serious organic disease. No one who has had to do with many of these cases will question the deplorable truthfulness of these latter statements.

Cabasse[4] says that pain disappears, swelling decreases, and the torn ligaments grow together again better.

Drachmann[5] reports twenty-two cases of joint-disease, mostly cases of synovitis, acute and chronic, healed by massage in an astonishingly short time.

Bergmann[6] reports 145 cases (70 talocrural, 8 tarsal and metatarsal, 10 of the wrist, 6 of the fingers and toes, 5 of the elbows, 2 clavicular-acromial, 3 humero-scapular), and summarizes the results as follows :

	Treated in first 4 days.	Between the 4th and 9th day.	8th day to 3 months.
Necessary to recovery,	12 44 séances.	17.60 séances.	44.68 séances.

It is thus very clearly seen that early massage has a direct relation to the length of treatment required.

In nine bad cases, given in detail, the injury being at the ankle and knee, the patients could walk after the third séance.

Mullier[7] found that while 42 cases of sprains treated by immobilization required a mean of 25.6 days, 37 cases treated by massage required only an average of nine days.

Gassner[8] summarizes his results in a corresponding number of cases, and shows an average of eight days when treated by massage, as compared to twenty-eight days by immobilization.

Treatment.	Ankles. 9 cases.	Knees. 7 cases.	Wrists. 6 cases.	Elbows. 2 cases.
By massage	9.9 days	9 days	5 days	9 days
By immobilization . . .	22 "	37 "	30 "	9 "

This tabulation shows a gain in time of 75 per cent. in favor of massage.

Gottlieb,[9] Johnsen,[10] Billroth,[11] Möller,[12] Nycander,[13] Graham,[14] Zabludowski,[15] Virchow,[16] and Hirsch, all report cases successfully treated in one-fifth the time by massage, and Roux[17] obtained much quicker and better results in sprains and dislocations masséed than by immobilization.

EXPERIMENTS.

Mosengeil injected India-ink into the knee-joint, and in two minutes afterward, during which he used massage, found the particles in the femoral lymph-nodes.

Massage à friction, says Metzger, presses the extravasations and exudates into the lymph-vessels, and conveys them away from the point of injury into the general circulation ; it also accelerates the blood-circulation by subsidizing the venous flow, at the same time producing slight hyperemia of the skin and other parts.

Nothing can better demonstrate the effectiveness of massage in emptying the vessels of an extremity than the method attributed to J. Wolf, of rendering a limb bloodless, before applying the elastic ligature, by elevation, and stroking toward the heart, now so commonly practised by surgeons.

"Lauder Brunton and Tunnicliffe (*Journ. of Phys.*, December, 1894) record the result of some careful observations of the effect of massage on the circulation. The experiments were undertaken in order to determine (1) the changes occurring in the circulation in a given group of muscles during and after massage; (2) the effect of massage of a large muscular area on the general blood-pressure. The experiments were carried out on cats, and the method used was the determination of the amount of blood passing in a given time from the efferent vein. The general results obtained are: (1) that during massage the flow of blood is increased through the muscles; (2) immediately after the cessation of massage an accumulation of blood occurs in the masséed muscles, which is followed by an increased flow through them; (3) massage of a large muscular area causes just a slight rise of blood-pressure followed by a fall which may amount to one-fifth of the initial blood-pressure. Both during and after massage of muscles a lowering of peripheral resistance in the corresponding area takes place, and hence more blood is propelled at each heart-beat from arteries to veins, and a fall of arterial tension ensues. The results are carefully compared with the effects of alternate compression and release of the arteries, and also with the effects of simply firmly grasping the muscles, both of which must be factors in the general result of massage. It was found that in each of these cases a rise and fall of pressure took place, but the effect was more transient. Gentle kneading was found to have more effect in causing a fall of blood-pressure than either compression and release of both external iliac arteries or of the muscles of both thighs."—*Times and Register*, Phila., 1895, vol. xxix, p. 93.

In endeavoring to account for these conditions from a pathologic standpoint I was disappointed in being unable to find any record of actual observations. Most authorities consider themselves justified in describing the anatomic changes occurring in sprains from their knowledge of the structures of the tissues involved and of the general behavior of healthy parts when subjected to traumatism.

Thus sprains are most generally defined as the result of forces that stretch the ligaments reinforcing the joint, the surrounding tendon-sheaths, the fibrous capsule of the joint, and the synovial membrane beyond their physiologic limits, or, in other words, forces that supersede the elastic coefficients of the tissues involved. The direct consequence of this is either partial or complete rupture of one or more of the parts mentioned, ranging from a slight over-distention of a single bit of tissue to the formation of a flail-joint. It is generally conceded, in addition, that at other portions of the joint farthest removed from the point of greatest tension, contusion and undue squeezing of tissues entering into the formation of the joint may occur. In consequence of these direct injuries, besides pain, tumefaction of the joint rapidly develops, due most frequently to intracapsular and extracapsular effusion of blood, and to an intra-articular acute serous exudation from the synovial membrane. In severe cases effusion of blood into the joint occurs, and especially when intra-articular ligaments are torn.

The numerous little tears and lacerations occur-

ring in the ligaments and capsules of the joint and neighboring tendon-sheaths are well distributed throughout the tissues affected. Gussenbauer points out that we must not imagine that the special cells composing the tissues are individually damaged, but that the larger elementary portions of the tissues are torn asunder in a similar manner, in which a microscopic specimen of tissue is teased for examination. It will thus be seen that it is the intercellular substance that gives way, and, although the life and function of the individual cells may thus be jeopardized by being cut off from their natural capillary blood-supply, it is primarily the intercellular rents that engage our attention. These are, of course, at once filled with exudate and extravasation, and immediate emigration of leukocytes and formation of granulation-tissue ensue, with fibroblasts and epithelioid cells, and all the paraphernalia of reparative inflammation, while the injured elements exhibit karyokinesis. What becomes of the effused blood within the joint and between the shreds of tissue? Small effusions of blood are absorbed by the lymphatics, the red blood-corpuscles are either carried away bodily by the leukocytes, or else disintegrate, and are carried off by the lymph-current, and give the lymph-nodes a pigmented appearance. Larger effusions, however, soon undergo coagulation, and subsequently become organized, being invaded by newly formed connective-tissue and bloodvessels. Finally, substitution by connective-tissue results, which persists for a period varying from several months to many years. Very large effusions may become encapsulated and

remain *in situ* for an indefinite period. Effusions into the joint-cavity proper, if not interfered with, probably do not coagulate quite so readily as elsewhere; but the fluid portions are eventually absorbed by the synovial membrane (not by the cartilage). After coagulation has occurred (which, according to Riedel, may take place after twenty-four hours; according to Volkmann, after two or three or more days) the same organization of coagulum may be observed within the joint as elsewhere. Effusions under the periosteum readily undergo osseous transformation. It will be readily seen from this description that the effusions of blood, both in the lacerated tissues and in and around the joint, do nothing else than interfere with the rapid progress of repair.

Although the effusion of blood in itself is only painful inasmuch as it causes undue tension, yet it is the cause of violent pain whenever any active movement is undertaken, and effectually prevents such movements from being carried out that might, of themselves, hasten the absorption of extravasations by improving the velocity of the lymph-current. The organization of the blood-clots, indeed, leads to the establishment of a definitive barrier to normal movement in the joints and in the tendon-sheaths.

On the other hand, the presence of a blood-clot in a partially ruptured portion of tissue does not in any way hasten the process of repair, for this is carried on by fibroblasts and karyokinesis in a much quicker and neater manner. In fact, the proper method of hastening repair would be to stimulate the circulation of the parts.

PHYSIOLOGIC EFFECT OF MASSAGE AS APPLIED TO SPRAINS.

If now we compare the physiologic effects of massage with the requirements and indications given by the pathologic conditions found in sprains, we must admit that the treatment by massage appears much better adapted to the circumstances than the older methods of rest and protection. The purely mechanic effects of massage consist in the expulsion and exportation of exudates and extravasations from the tissues, while the secondary effects embrace the stimulation of the circulation (as well as of the muscle-fibers and nerve-elements) and the production of molecular changes leading to alteration of sensation and the process of nutrition. These statements are made in regard to massage practised very soon or immediately after the injury. That massage is of the greatest benefit at a later date for combating stiffness, or ankylosis, or pain, in diminishing the products of a too-extensive inflammation or organization of exudates, and in breaking up vegetations, as well as improving the functions of degenerate muscle-fibers and nerve-fibers, is generally admitted by all, and need not here be specially dwelt upon.

VAN ARSDALE'S METHOD AS DESCRIBED BY HIMSELF.

In treating a sprained ankle by massage it is convenient to have the patient lie at full length on a rather low table (from 18 to 24 inches high) upon his back with his head on a pillow, or upon his abdomen, with the flexors of the leg relaxed. The limb should

be bared to well above the knee, and no constricting garments should be permitted to interfere with the circulation in the thigh. Examination of the injured joint having been made, the circumference of the limb and the extent of motility noted, the entire foot and leg are next moistened with chloroform-oil uniformly applied by means of gentle rubbing over the entire surface. The gentle touch thus first brought to bear upon the parts has the advantage of reassuring the patient. In applying the emollient care must be taken to arrive at a "happy mean," as too little will result in friction, which will irritate the skin and increase the discomfort of the patient, while an excess causes the hand to slip over the surface, and results in an unnecessary waste of strength, an early fatigue on the part of the *masseur*, without accomplishing the desired effect.

Beginning well above the tender or swollen portions of the limb gentle, systematic, upward strokes are carried well above the knee. These first strokes are made with the pulp of the fingers, both hands being used and held parallel with the leg. At first the sides of the leg are attacked, one with each hand; but soon more of the palmar surface of the fingers are brought into contact with the skin of the patient and gradually surrounds the whole circumference of the leg, each stroke being long and slow (not more than thirty to the minute). As the force of the pressure is gradually increased, the pulp of the thumb is brought into play, and the right hand supersedes the other in force and activity until it will become necessary to grasp the lower part of the heel or metatarsals and make counter-traction in

order to steady the limb and permit of a greater development of force.

When the leg, by a change of color from blue to white, shows evidence of depletion of venous blood and lymph, the strokes may begin lower down and more directly over the seat of injury, always being carried upward with the pressure exercised by the fingers—delicate, at first, but with ever-increasing intensity, with the thumb of one hand only, while the other hand steadies the foot in the most convenient position.

The tissues, which were hard and resistant to the touch at first, soon become softer and more elastic, and with this the pain at first experienced by the patient grows gradually less and his confidence in the operation increases.

From time to time, whenever the superficial veins of the leg that were first emptied appear engorged or swollen, it is considered imperative to continue the strokes upward to above the knee, and repeat the massage of the upper leg in order to evacuate the newly imported supply of blood and lymph well into the vessels of the thigh, and, as it were, "drive the fluids home." In like manner the toes and the portions below the place of injury are visited and their tissues also are emptied of the stagnant fluids.

The region around the ankle is now considerably smaller, paler, and softer than at first, and the thumb, keeping up the upward stroking all the time, and moving with an independent action against the fingers placed opposite to it on the limb, busies itself finding out the special points around the joint

where more marked hardness and stiffness may be felt, and in diving down between the bony projections and tendon-sheaths, while it glides more lightly over the prominences and ridges of bone. The well-trained thumb is very quick at discovering the points of special soreness, even without the help of the patient's subjective sensations, and will make them special points of attack. When fatigue is experienced the hands are changed and the work carried on with the left.

Toward the end of the séance, which must be indicated by the patient's sensations and condition, the strokes are made to grow gradually more gentle again, and, becoming longer, extend from the foot well up to the knee, more closely resembling those described by some authors as *effleurage*. This procedure always gives the patient a sensation of pleasure and relief, and when the séance is ended he should be entirely free from pain, at least for a time. If he is not, it is a sign that the massage has not been properly applied.

The secondary measurements may be now taken, and if passive motion of the affected joints is considered advantageous this may now be carried out a limited number of times.

The remaining oil may now be wiped from the skin with a dry towel.

A mixture of equal parts ol. hyoscyami coct. (Ph. G.) and pure chloroform has proved the most serviceable lubricant. Rancid oil and impure chloroform should be avoided on account of the disagreeable odor and the resultant dermatitis.

The results obtained have demonstrated the truth-

fulness of the claims of others, and have shown that the earlier the massage is begun the shorter the time necessary for recovery.

Massage the limb twice daily, morning and afternoon, for half an hour at a time. After massage rest the joint for half an hour, and then permit the use of the limb in walking. Elevation of the leg between séances is always advisable. Moist warmth is useless.

INDICATIONS.

Massage is indicated in subcutaneous hemorrhage (hematoma), traumatic joint-inflammations, recent or of long standing, and other late forms of inflammation, such as that from rheumatism, etc.

Fractures at the ankle are not jeopardized by very early massage, but whether or not massage later on (during the first week) is harmful all are not agreed.

Immediate massage, on the contrary (if need be, under anesthesia), permits of a better diagnosis, and in cases with great swelling hastens the union of fragments by removing the blood and exudation between them. If fracture is made out, the massage is not to be repeated.

CONTRA-INDICATIONS.

Massage should never be applied in bacterial inflammations, *i. e.*, tuberculous, gonorrheal, or pyemic joints.

SUMMARY.

It is believed that the foregoing statements substantiate the following claims, viz., that massage of sprained joints will

1. Prevent swelling, or rapidly disperse it if present.

2. Prevent pain, or quickly remove it when due, as it must be, to tension.

3. Prevent stiffness, or overcome it when already present from disuse.

4. Prevent the sense of weakness and restore the part to its original vigor and strength.

5. Reduce the time of treatment from *weeks* to a corresponding number of *days*.

6. Permit the immediate use of the injured member.

I wish to acknowledge my indebtedness to Professor Van Arsdale for his courtesy in allowing me during the past three years to assist at the Good Samaritan Dispensary, and to compare the methods and results of treating sprains.

REFERENCES.

1. *Graham, D.:* Recent Developments in Massage, 1893.

2. *Page, H. W.:* Wood's Medical and Surgical Monographs, 1891, vol. x.

3. *Sands, H. B.:* Annals of Surgery, St. Louis, 1887, vol. v.

4. *Cabasse:* Gazette des Hôpitaux, 1871, Nos. 17 and 18.

5. *Drachman:* Ugeskr. f. Läger, 1874, 3 R. xviii, Nos. 16, 17.

6. *Bergmann:* Nord. Med. Arkiv, 1875, Bd. vii, No. 13.

7. *Mullier:* Arch. Méd. Belges, July, 1875 (V. and H. 75).

8. *Gassner:* Bayr. Arztl. Intell. bl., 1875, No. 35.

9. *Gottlieb:* Ugeskr. f. Läger, 1874, 3 R. xviii, Nos. 16, 17.

10. *Johnsen:* Hospits. Fitende, 1874, 2 R. No. 49.

11. *Billroth:* Wien. Med. Woch., 1875, No. 45.

12. *Möller:* Journ. de Méd de Bruxelles, 1877.

13. *Nycander:* Journ. de Méd. de Bruxelles, 1877.

14. *Graham:* N. Y. Med. Record, 1877.

15. *Zabludowski:* Petersburg Med. Woch., 1885, Nos. 28, 29; Berlin Med. Woch., 1885, Nos. 26 to 28.

16. *Virchow and Hirsch:* Jahrbücher, 1884, No. 1.

17. *Roux:* Revue Méd. de la Suisse Romande, 1886, Nos. 1, 2, 3

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