and heart-block, complete or incomplete, by Laubry *et al.* (1921), Gallavardin (1922), Coffen (1930), Tuohy and Boman (1931), and others. But, so far as we can ascertain, this is the first case on record of atypical right bundle-branch block with anterior wall infarction arising as the result of a chest-wall injury and attended by clinical recovery.

Summary

A case report is presented of anterior wall infarction with atypical right bundle-branch block, arising directly after a crush injury to the chest wall, in a perfectly healthy young man and attended by clinical recovery.

So far as can be ascertained, this is the first case of its kind in the medical literature.

A short review is presented of present-day views on the subject of traumatic heart disease.

REFERENCES

- Barber, H. (1938). *British Medical Journal*, **1**, 433.
 — (1940). *Ibid.*, **2**, 520.
 Bayley, R. H. (1934). *Amer. J. med. Sci.*, **188**, 236.
 Beck, C. S. (1935). *J. Amer. med. Ass.*, **104**, 109.
 Bilderbeck, A. C. L. (1919). *British Medical Journal*, **1**, 675.
 Bright, E. F., and Beck, C. S. (1935). *Amer. Heart J.*, **10**, 293.
 Coffen, T. H. (1930). *Ibid.*, **5**, 667.
 Friedberg, C. K. (1949). *Diseases of the Heart*. W. B. Saunders, London and Philadelphia.
 Gallavardin, L. (1922). *Lyon med.*, **131**, 545.
 Goldberger, E. (1949). *Unipolar Lead Electrocardiography*, 2nd ed. Lea and Febiger, Philadelphia.
 Hamilton, J. A. (1934). *British Medical Journal*, **2**, 1101.
 Hay, J., and Jones, H. W. (1927). *Ibid.*, **1**, 559.
 Kahn, M. H. (1930). *Amer. J. med. Sci.*, **179**, 605.
 — and Kahn, S. (1929). *Ann. intern. Med.*, **2**, 1013.
 Kienle, F. (1938). *Z. Kreisforsch.*, **30**, 674.
 Kissane, R. W., *et al.* (1937). *Ann. intern. Med.*, **11**, 907.
 Külsb, F. (1909). *Mitt. Grenzgeb. Med. Chir.*, **19**, 678.
 — (1937). *Med. Klinik*, **33**, 377.
 — and Strauss, L. H. (1932). *Klin. Wschr.*, **11**, 1572.
 Laubry, C., *et al.* (1921). *Bull. Soc. méd. Hôp. Paris*, **45**, 1363.
 Levison, L. A. (1928). *Ann. intern. Med.*, **1**, 227.
 Macdonald, D. (1941). *J. Amer. med. Ass.*, **116**, 2846.
 Moritz, A. R., and Atkins, J. P. (1938). *Arch. Path.*, **25**, 445.
 Reed, L. K., and Berger, K. E. (1945). *Amer. Heart J.*, **30**, 622.
 Rosenbaum, F. F., *et al.* (1944). *Ibid.*, **27**, 783.
 Schlomka, G. (1934). *Z. ges. exp. Med.*, **92**, 552.
 Schmincke, A. (1925). *Dtsch. Arch. klin. Med.*, **149**, 145.
 Tuohy, E. L., and Boman, P. G. (1931). *Ann. intern. Med.*, **4**, 1373.
 Urbach, J. (1922). *Beitr. gericht. Med.* (Aberda), **4**, 104.
 Warburg, E. (1938). *Subacute and Chronic Pericardial and Myocardial Lesions due to Non-penetrating Traumatic Injuries*. London.
 — (1940). *Brit. Heart J.*, **2**, 271.
 Wilson, F. N., *et al.* (1932). *Amer. Heart J.*, **7**, 305.
 — (1934). *Ibid.*, **9**, 472.

Professor A. C. W. Hutchinson, giving his inaugural lecture at Edinburgh University (*Scotsman*, October 30), traced the course of dental history in Edinburgh. In 1876 the Edinburgh Dental Hospital and School was established, owing its beginning to the generosity of a few members of the dental profession who not only provided the funds but also gave up their time to teach the students. The first woman student was admitted 14 years later, and became the first woman to qualify as a dental surgeon; she was Lilian Lindsay, who celebrated her 80th birthday this summer. To-day there were 21 full-time posts on the establishment of the hospital and school, and the major problems were those of demolishing the old parts of the buildings and erecting new ones in their place, and of improving still more the standard of the teaching. Before the war negotiations were begun with the University with a view to making the dental school an integral part of the University. These had to be discontinued during the war, and were resumed after it; in 1948, at the beginning of the Health Service, the school was transferred to the University. The course for the degree of L.D.S. was instituted in 1949. He said the greatest task of all must be to substitute prevention for repair, and as a foundation students should be instructed in developmental factors, including nutrition, and more attention would have to be paid to children's teeth.

DIATHERMY TREATMENT OF ANGIOMATA

BY

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Benign tumours of blood and lymph vessels are relatively common, but there is no unanimity of opinion regarding their treatment. The present-day method of treating angiomas depends on the worker and his tools, and, on the whole, it may be said that the surgeon uses the scalpel or diathermy, the radiotherapist x rays or radium, and the dermatologist carbon dioxide snow. As the majority of these tumours are usually located in conspicuous areas, a good cosmetic result is an important consideration.

This paper is concerned with an attempt to improve the diathermy method, which has fallen into disrepute on account of disfigurement and scarring resulting from necrosis and ulceration of the healthy skin through which the current must pass. Nevertheless, in diathermy we do possess a safe and sure agent for the treatment of angiomas, provided that the high-frequency current is applied to the tumour without damage to the skin or the normal tissues through which the electrode is introduced. With this in view a special insulated needle electrode has been prepared and used with great success in more than 80 cases.

Some General Remarks

An angioma is a tumour composed of blood or lymph vessels. Normal blood vessels are derived from a vascular network, and it is said that the primary factor in the development of an angioma is the persistence of part of this network. They are therefore not true neoplasms but anomalies of development. Clinically the angiomas are divided into two distinct groups: (a) the haemangioma, which is composed of blood vessels containing circulating blood; and (b) the lymphangioma, which consists of lymphatic vessels and contains lymph. The subdivisions of these two groups which are suitable for treatment are discussed below.

It has been stated (Ribbert, 1898) that angiomas have no anastomotic communications with surrounding blood vessels, but my experience does not confirm this view. If the blood supply were a limited one, many of the attempts to destroy this tenuous supply would cause spontaneous disappearance. Cure cannot be expected unless every portion of an angioma is destroyed.

The smaller haemangiomas seen in children often disappear without treatment, but spontaneous disappearance of the larger lesions should not be awaited, because early treatment with low-intensity diathermy is safe and gives the best result.

Method

The diathermy coagulates the tissues by an intense heat generated in the vicinity of the active electrode. If the needle electrode is non-insulated the tissues surrounding it will be charred throughout the length of the needle. This causes unnecessary injury to normal tissues. In the method about to be described the needle is insulated except at its tip, and in this way the current is delivered only to the spot which requires treatment, and damage to the normal structures is avoided.

Preparation of the Special Needle

Straight intestinal needles of various sizes and lengths are generally chosen, but curved ones may also be used. All grease is removed from them by washing in ether, and the blunt end of each is then pushed half an inch into a cork. The cork acts as a holder for the needles, which are then ready for insulating. This is done by immersion in a jar of wire enamel* which is similar to that used for the insulation of high-tension electric cables, the ends of the needles embedded in the cork remaining non-insulated. The needles are withdrawn, allowed to drain for a few seconds, and then placed upright in an oven and baked at 180° C. for 15 minutes. This time should be sufficient to harden and dry the enamel. Lower temperatures will take longer. The immersion is repeated twelve or more times until it is certain that the insulating coat is thick enough to resist the diathermy current. When the needles are sufficiently insulated they acquire a deep mahogany colour. On completion of the baking process they are removed from the cork and 1-2 mm. of the insulation is removed from the pointed ends with a scalpel blade. They are then placed in a test-tube and autoclaved before use.

The choice of a long or short, straight or curved needle depends on the site and size of the angioma. The uninsulated base of the needle is clamped in the groove in the jaws of a diathermy haemostat (Aiken, 1944) or fixed in the usual bakelite holder and connected to the diathermy machine. Either the spark-gap or valve diathermy may be used, but the former is more satisfactory.

Anaesthetic

As a rule I use intravenous thiopentone for adults and ethyl chloride or "trilene" for infants. Ethyl chloride may be used with safety, because the coagulation is carried out in the depth of the tissues and there is no external sparking to cause an explosion.

Skin Preparation and Site of Puncture

The majority of patients attend as out-patients and the skin is prepared with spirit before administration of the anaesthetic. The needle, lubricated with petroleum jelly, is introduced through the skin or mucous membrane at some little distance from the tumour and pushed along through the normal tissues into the tumour. A cavernous angioma of the tongue may be treated by inserting the needle through the skin of the submental triangle. This technique has the advantage that the insulated needle delivers the current to the tumour without burning the normal skin or other normal tissues adjacent to it, and the brisk bleeding which follows direct puncture of the lesion is avoided.

Application of the Current

A small tumour will need the application of the current at one point only, whereas a large angioma should be treated at multiple points—1-2 cm. apart—and it is better to treat a segment of it rather than attempt its complete destruction at one session. The current must never be of high intensity, and it is most important that it should be applied only for a few moments, say two to five seconds at each point. With longer applications the great heat generated is dissipated throughout the tissues, and if it is too intense the skin

will slough. The surface heat should be just perceptible to the operator's bare finger, which acts as an additional guard against overheating. If overheating has occurred, spread to the skin must be prevented by cooling the area with a swab soaked in cold water. Furthermore, the point of the needle should never be allowed to come too near to the surface during the treatment, because sloughing of the surface tissue may take place and compromise the result. This risk is easily avoided by careful palpation of the needle point before turning on the diathermy current. A semi-darkened room is an advantage, as the radiating sparks give an indication of the proximity of the needle point to the surface.

Those not familiar with the method are recommended to treat the lesions frequently with a low-intensity current rather than to risk overheating the part. In order to obtain the best results it is a wise principle at all times to undertreat rather than overtreat, aiming at resolution with the minimum of scar formation.

After-treatment

The part becomes swollen within a few hours of treatment, but, except in young children, no dressing is required unless the skin is blistered. Should this happen "tulle gras," covered with dry gauze, may be applied and held in position with strapping or a bandage. In infants it is always wise to cover the treated lesion to prevent scratching and subsequent infection. Angioma in the mouth do not require any after-treatment other than the usual attention to oral hygiene. Mouth washes of glycothymoline are recommended. Repeated sessions may be necessary to complete the treatment, and these are best carried out at intervals of three to six weeks until the entire tumour has disappeared. Large and difficult tumours need careful follow-up, and recurrences should be treated as they arise. The patient suffers little inconvenience.

Results

Over 80 angiomata have been treated in the past five years with the special needle here described. They include the following types.

Blood and Lymph-vessel Tumours

Capillary angioma	..	..	..	..	..	45
Cavernous angioma	..	..	..	..	..	32
Racemose type	..	..	..	..	..	1
Port-wine stain	..	..	..	..	..	1
						79
Capillary lymphangioma	..	..	..	..	..	2
Cystic hygroma (cavernous)	..	..	..	..	..	1
						82

Treatment is usually sought for cosmetic reasons, and the ultimate prognosis depends on several factors. Generally, it may be said that the larger the original tumour the greater will be the disfigurement, and this applies particularly to the capillary lesions, which are so superficial. Even in these, however, when treatment has been completed, the epithelium becomes thicker and the mark less noticeable as the years go by. Any difference in the appearance can be skilfully covered by judicious cosmetics. It should be remembered that all forms of treatment entail a certain degree of scarring.

Capillary Haemangioma.—These formed the largest single group treated by the special needle. The small growths were all readily and easily treated. Those of several centimetres diameter were tedious to treat, but the response was always good and there were none of

*The wire enamel was kindly supplied to me by Messrs. Connolly, of Blakley, Manchester.

the untoward sequelae from diathermy, such as interference with the epiphysal growth, damage to the eyes, or epilation, that may result from radiotherapy. The superficial nature and delicate endothelium of the large capillary angioma tempted me to treat a few with a flat-button electrode of 7 mm. diameter. Cosmetic results were excellent, and the method was less tiring than treatment from beneath by the insulated needle, but a low-intensity current must be used to avoid overheating the tissues, with subsequent sloughing and scar formation. The latter method is undergoing further trial with electrodes of various diameters.

Cavernous Angiomata.—These are generally situated deeply and are covered by healthy skin or mucosa, little or no blemish being left after treatment. Some of my best results were obtained in these cases (see illustration),

Photographs showing cavernous angioma of lower lip before and after treatment with the insulated needle.

the response often being dramatic. With care the tissues and configuration of the area—apart from the deep scarring in the tumour—may be returned to normal. Some of the cases had been treated by irradiation previously, and in these diathermy was used carefully because of the danger of sloughing of the irradiated tissue.

Port-wine Stains.—These present a problem best left to the plastic surgeon. In the one case treated there were obvious capillary overgrowths in parts of the stain. The recorded case responded well and the patient was delighted with the result, but the treatment was an arduous and difficult undertaking. The lesion involved the right side of the face and both eyelids, and great care was needed to avoid scarring and resultant contractures. The port-wine portion of the stain remained almost entirely unaffected by the treatment.

The two *capillary lymphangiomata* occurred in the tongue. They were considerably reduced in size and showed marked improvement after four treatments with the needle electrode. Neither case has required further attention for the past two years.

The *cystic hygroma* was a small one situated in the left supraclavicular fossa. It disappeared completely after a single treatment by the needle electrode four years ago, and there has been no recurrence. Because of the remarkable power of growth which these tumours possess, treatment at the onset is advocated.

In the present series there was only one case of *cirsoid aneurysm*, and it involved the left superficial temporal artery. The main artery was ligated and the

remaining secondary varicosities were treated with the diathermy needle electrode on four occasions. The tumour disappeared entirely, and when the patient was examined two years later it had not recurred.

I have had no experience of the treatment of the angiomata involving a whole limb, and I very much doubt if this method of treatment could be applied with success. Fortunately these extensive lesions are rare.

Summary

A series of 82 patients with angiomata have been treated with diathermy, and these have been followed up for one year after treatment. All forms of angiomata, except the port-wine stain and angiomata involving a whole limb, may be treated with a specially insulated needle. This method is simple and safe, and gives a cosmetic result which is comparable with that of other methods of treating capillary angiomata, and is superior to them in the treatment of cavernous angiomata. The preparation of the special needle and the way to use it are described.

I wish to thank Mr. Wilfred Hynes, our plastic surgeon, for his great help and criticisms, and for allowing me to treat patients under his care. I am also grateful to Mr. H. Blacow Yates and Dr. E. R. A. Cooper for the help they have given me.

REFERENCES

- Aiken, D. (1944). *Lancet*, 2, 212.
Ribbert, V. A. (1898). *Virchows Arch.*, 151, 381.

USE AND INTERPRETATION OF THE FANTUS ESTIMATION OF URINARY CHLORIDE

BY

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Since its advocacy by Marriott (1947), the ward test of Fantus (1936) for estimating urinary chloride ion concentration has been widely used in clinical practice. This communication describes experiments which have been made to determine its reliability, and records circumstances in which interpretation of the test in the normal fashion would lead apparently to mistaken conclusions about the electrolyte requirements of certain patients.

Methods

Fantus Test.—The method described by Fantus (1936) was used. It is essentially a modification of the Mohr (1856) titration. To 10 drops of urine a drop of 20% potassium chromate solution is added. With the same dropper, silver nitrate solution (29 g. per litre) is added drop by drop until a permanent and distinct colour change to red-brown occurs. The number of drops thus required is taken as a measure of the content of chloride in grammes of NaCl per litre.

Volhard Titration.—The method described by Peters and Van Slyke (1932) was used.

Results : (a) Anions Estimated by the Test

It is usual to estimate chloride ions in urine by a method involving their precipitation as silver chloride in acid solution, as in neutral or alkaline solution other silver compounds may be precipitated and render the