appeared promptly after removal of the rib. In an investigation on the cause of the dilatation he performed experiments in which an artery was partially occluded by a metal band. He concludes that circumscribed dilatation of an artery may arise distal to a constriction, the dilatation being at a maximum when the lumen of the vessel is reduced to a third or a quarter; and that it is constriction of the subclavian artery which produces the dilatation sometimes noted distal to a cervical rib. The portion of the artery distal to the constriction forms a relatively dead pocket, and, in his opinion, the dilatation is probably due to the whirlpool-like play of blood in this. He believes that probably vasomotor paralysis, trauma, and sudden variations in the blood pressure in the artery play no part. Halsted does not distinguish simple dilatation of the artery and "true aneurysm."

Since Halsted's article at least two further cases have been reported.

Moore³ records a case in a man of 55 in which there was a saecular aneurysm the size of a cherry springing from the anterior surface of the artery just distal to the rib. There was neither bruit nor thrill over the aneurysm, it was increasing in size, and there was no difference in the radial pulses. The Wassermann reaction was strongly positive. Good recovery followed ligation of the artery on either side of the aneurysm.

Billington⁴ describes a patient of 42 who came under observation with a pulsating swelling in the left side of the neck; there was a difference in timing of the radial pulses. One month later the left radial pulse had disappeared and pain was severe. After a further five months the pulsation in the swelling had gone. There were no nervous signs. X-ray showed a fully developed cervical rib on the right side and an incomplete rib on the left. The Wassermann reaction was negative. The patient made an uneventful recovery following excision of the aneurysm. The aneurysm consisted of a fusiform swelling $2\frac{1}{2}$ in. in length and with a maximum diameter of $3\frac{1}{4}$ in. It was almost completely occluded by thrombus. No primary disease of the intima was found.

Discussion

It appears to us that Moore's case was of a different nature from the others, and produced by different factors; the aneurysm was saecular in character and not associated with a difference in the radial pulses, and there was evidence of a syphilitic infection.

The case we have described seems to fall into line with the others recorded and with Halsted's experimental results—that is, there is a circumscribed dilatation of the subclavian artery immediately distal to a constriction caused by a cervical rib. We shall not attempt to define the conditions under which the dilatation of an artery shall be termed aneurysmal, but maintain that, clinically at least, the swelling in our case is an aneurysm of the third part of the subclavian artery. It is worthy of note that this aneurysm had evidently been present for thirty years without enlargement and without symptoms.

Summary

A case has been described of left subclavian aneurysm in association with cervical rib. The aneurysm had been present for at least thirty years, but neither it nor the rib had produced any symptoms until a fall on the shoulder caused a displacement of the rib.

We are indebted to Dr. Whately Davidson of Newcastle-on-Tyne for the radiograms of the case.

REFERENCES

- ¹ Keen, W. W.: *Amer. Journ. Med. Sci.*, 1907, cxxxiii, 196.
- ² Halsted, W. S.: *Journ. Exper. Med.*, 1916, xxiv, 271.
- ³ Moore, C. A.: *Lancet*, 1922, i, 1045.
- ⁴ Billington, W.: *Brit. Journ. Surg.*, 1931, xix, 334.

A CASE OF BLINDNESS AFTER N.A.B.*

BY

FRANK JULER, F.R.C.S.

OPHTHALMIC SURGEON AND LECTURER IN OPHTHALMOLOGY,
ST. MARY'S HOSPITAL

The organic preparations of arsenic used medicinally are divisible into two groups—the pentavalent and the trivalent. The former derives from arylarsinic acid and comprises atoxyl, soamin, arsacetin, hectine, orsudan, indarsol, stovarsol, treparsol, and tryparsamide. The trivalent group obtains from arsenobenzene, and contains salvarsan and its allies. The synonyms of salvarsan are "606," arsenobillon, arsenobenzol (France), and arsphenamine (U.S.A.). Similarly, neosalvarsan is known as "914," N.A.B. (novarsenobillon), novarsenobenzol (France), and neoarsphenamine (U.S.A.).

Cases of blindness after administration of the pentavalent group were early recognized, and were collected by Lawford in a paper opening a discussion in 1916 (*Trans. Ophth. Soc.*, vol. xxxvi, p. 12). He mentioned cases of blindness following atoxyl reported by Koch, Kopke, Morax, and McAdams. In 1910 Ernest Clarke (*ibid.*, vol. xxx, p. 240) reported blindness after soamin and orsudan; and it is known to occur after stovarsol and treparsol. Tryparsamide is a drug which has been in use recently for neural syphilis and trypanosomiasis (Lees, *ibid.*, vol. lii, p. 208), but there is an admitted danger of optic atrophy, and its administration calls for care, especially during the first few injections. (See also Woods and Moore, *Journ. Amer. Med. Assoc.*, vol. lxxxv, p. 329).

Reports in the Literature

With regard to the trivalent arsenical preparations, the report of the Salvarsan Committee of the Medical Research Council in 1922 (Special Report No. 66) includes a section on the toxic effects of these drugs. It refers to an enormous amount of material from military hospitals and civil treatment centres. Altogether 140,636 cases are included, and no blindness was reported, although there were forty-nine fatalities. German figures are also mentioned. In 1914, 74,018 German cases were reported, including one in which blindness resulted. Further German figures in 1917 referred to 265,158 cases without any blindness. Thus, in a grand total of 479,812 cases, only one case of blindness was reported after the use of the salvarsan group.

In 1916 Lawford stated (*loc. cit.*, p. 25):

"After '606,' optic nerve lesions and lesions of the third, seventh, and eighth nerves have often occurred, which develop from a few days to six weeks after the injection. These usually, but not invariably, disappear if further treatment by '606' or mercury is adopted. These lesions are undoubtedly syphilitic, but are precipitated by salvarsan."

In 1927 J. G. Hopkins wrote (*Amer. Arch. of Ophthal.*, vol. lvi, p. 543):

"The production of optic atrophy by arsphenamine in a previously uninjured eye has never been proved, but with a pre-existing neuritis of primary optic atrophy, it may appear to cause damage."

In 1928 S. O. Chambers also reviewed the literature, and finds that reports of damage to the eye from salvarsan are very rare (*ibid.*, vol. lvii, p. 412). In 1930 Dr. Gunn said that the trivalent preparations did not cause amblyopia (*Trans. Ophth. Soc.*, vol. i, p. 392). In 1931 E. A. Seale (*Journ. Med. Assoc. of South Africa*, p. 528) reported the case of a man, aged 54, who

* Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, Bournemouth, 1934.

lost vision after a first injection of 0.75 gram of N.A.B. Three more similar doses were given without further effect. The vision was reduced to 1/60 in each eye, with white sharp-edged disks and narrowed vessels. The field to white was full; that to colour was lost. Two months later it had improved so that the right vision was 3/60, the left 6/60.

Case Record

The case I have to report is as follows:

History and State.—A married woman, aged 46, was brought to hospital on account of a positive Wassermann reaction. She was admitted with a history of some mental abnormality (? nervous debility), two miscarriages, and several attacks of aphonia. She had undergone appendicectomy and removal of gallstones seven years previously. On admission she was found to have an aortic systolic murmur, but there was no complaint of vision, and her mental and general condition appeared good. She had had no eye trouble previously.

Treatment and Progress.—She was given a course of N.A.B. by the resident medical officer in six doses, commencing with 0.3 gram and concluding with 0.9 gram twenty-eight days later. (The dates and doses are recorded as follows, but there is some doubt as to their exactitude: first day, 0.3 gram; fourth day, 0.45 gram; eleventh day, 0.5 gram; sixteenth day, 0.6 gram; eighteenth day, 0.75 gram; twenty-ninth day, 0.9 gram.) She was also given mist. hydrarg. biniodidi by mouth. She developed a skin rash on the day after the last injection. Fifteen days later she became rapidly blind in both eyes, the left lost all perception of light, the right vision was reduced to hand movements. I saw her two days later and noted that both disks were white, with slightly hazy outlines, and that the arteries were narrow, with white lines along them. The vision varied but little afterwards, and two years later she still had no perception of light in the left, and bare perception of light in the right eye. The disks were white with hazy edges; some of the vessels were small, some of fair size.

Outcome.—Her general condition remained fair at the time of the onset of blindness; she was in a somewhat toxic state, but there was no encephalitis and no meningitis. The rash noted previously had subsided. The cerebro-spinal fluid was not examined. Trinitrin was administered on the day after the onset of the blindness, and a few days later sodium thio-sulphate was given intravenously, but without benefit. The Wassermann reaction and the Kahn tests were still positive two months later.

Commentary

The rarity of this complication renders the above account open to criticism, but the facts are as they have been recorded. The woman was admitted with no ocular complaint; she became blind. There is no doubt but that she was treated with N.A.B., but the exact dates and doses cannot be vouched for. The dimness of vision affected both eyes simultaneously and was rapid in its onset. There was no gross oedema of the disks, and the whole appearance seems to resemble that seen in quinine poisoning in the optic pallor and narrowing of the vessels of the retina.

In the report of the special committee of the Medical Research Council the opinion is expressed that some ill effects of salvarsan are due to inorganic arsenic (a capillary poison), which is slowly broken down after injection, and the late action is thus explained. The reactions of salvarsan are classified as follows: (1) immediate—for example, diarrhoea, vomiting, fever, and headache; (2) encephalitis haemorrhagica—two to five days later; (3) liver affections—(a) jaundice, early and transient, or (b) jaundice, occurring several weeks after the end of the course of treatment, and running a long period, (c) acute yellow atrophy; (4) exfoliative dermatitis, which may be late, and may be fatal from septicaemia; (5) rare lesions—for example, acute nephritis, enteritis, polyneuritis, and aplastic anaemia; and finally,

(6) the Herxheimer reactions, from relapse of syphilis, owing to a sudden liberation of spirochaetal toxins. (These include nerve lesions, especially the cranial nerves, and are more likely to affect structures which have already been attacked by the disease. Such reactions may start after the first injection or after the end of a series.)

In the present instance the pathological site and mechanism are open to discussion. As far as was known there was no gumma or other gross lesion present, the solution of whose walls might set free spirochaetal toxins to attack the optic nerve. It would seem that it is more likely to have been a case where the arsenic itself has affected the optic nerve, the retina, or its blood vessels.

Clinical Memoranda

THE USE OF FASCIA LATA SUTURES

The particular method of obtaining a fascia lata strip is decided by two factors—namely, the difficulty or ease of the method and the after-effects on the patient. Leading authorities insist on the need of closing the gap left in the fascia lata after removing the strip, and this, of course, necessitates a skin incision corresponding in length to the length of the fascial strip obtained. Gallie and Le Mesurier¹ say that failure to close this gap results in "mild bulging muscle hernia, and some of these people speak of a feeling of moderate weakness in the thigh." Orrin² says that omission to close the gap "bequeaths to the patient a heritage or soreness, an aching, and a constant tiredness in the area and in the limb, and so impairs, in greater or less degree, the usefulness of the limb itself." In face of such authority it was with some trepidation that I employed for a small series of cases of hernia a fascial strip cut subcutaneously through small incisions in the thigh. This leaves, of course, the gap in the fascia lata unsutured, but the saving in time and trouble over suturing the gap in fascia and skin is considerable.

TECHNIQUE

The instrument used was that described by Lane and Austin,³ and known as the "Meath Hospital fascia cutter." It consists of a handle bearing a long rod, at the end of which is a strip with a knife-edge bent into a U shape. This cutting strip is introduced through a small skin incision into two small cuts in the fascia lata, marking out the width of fascial strip desired. Pushing the handle along then results in this strip being separated from the rest of the fascia on each side. It is claimed that the strip of fascia may be cut through the one small incision, the instrument being designed so that a turn of the handle cuts across the fascial strip at any desired length.

In actual practice two modifications will be found to save time. First, the overlying skin is bound down to the fascia lata by tough bands of fibrous tissue, and these should first be broken down and the skin and fascia separated over the area from which the strip is to be taken. This is best done by using the spatula-like handle of the fasciotome invented by Rowlands. The fascia separates easily from the underlying muscle as it is cut. Secondly, it will be found easier to cut the strip across at the upper end under direct vision through a second small incision.

RESULTS

I have traced twenty-five of my cases and examined them at intervals of from three and a half months to two years after operation. This number is small, but

¹ Gallie, W. E., and Le Mesurier, A. B.: *Canadian Med. Assoc. Journ.*, August, 1930, p. 165.

² Orrin, H. C.: *Fascial Grafting in Principle and Practice*, 1928, p. 33.

³ Lane, T. J. D., and Austin, T. A.: *Lancet*, 1930, i, 622.