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A SPECIAL COMPRESSION BANDAGE IN THE TREATMENT OF VARICOSE ULCER OF THE LEG

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In 1953, Cocket & Jones demonstrated, that the skin and subcutaneous tissue on the inner side of the ankle and lower third of the leg, the so-called ulcer area, is drained exclusively through short communicating veins which empty directly from the capillary area in the subcutaneous tissue into the posterior tibial vein. Thus this area is not drained by the saphenous systems. In venous valvular incompetence the blood flows from the deep veins into the subcutaneous tissue, making the capillary pressure very high, in the erect position about 120 cm H_2O (Bauer & Hæger 1962), which is higher than the arteriolar pressure. This entails oedema with tissue anoxia and necrosis in the subcutaneous tissue gradually involving the skin, leading to fully developed varicose ulcer of the leg (Dodd 1964, Hansson 1964, Sørensen 1964). Incompetence of communicating veins is the most common cause of ulcer. Incompetence of the saphenous vein may also lead to the development of an ulcer in some cases (Dodd 1964, Sørensen 1964).

Therefore, causal therapy in the preoperative management of the ulcer must consist in reducing the excess venous pressure and keeping away the oedema (Arnoldi 1959, Gundersen 1965, Sjøberg 1965, Sørensen 1965). This may be done by prolonged bed rest with elevation of the limb, either at home or in hospital. However, this is best avoided because of the risk of thrombosis, and because many of the patients are elderly. Local treatment of the ulcer and compression bandages are used instead, either zinc gelatin bandage, tensoplast bandage, or elastic bandage, applied from the toes to the knee, in combination with local ulcer therapy (Arnoldi 1959, Bauer & Hæger 1962, Dodd 1964, Gundersen 1965, Hansson 1964, Sjøberg 1965, Sørensen 1964). The zinc gelatin and tensoplast bandages are designed to be worn for up to 4 weeks and therefore can be applied only by specially qualified and

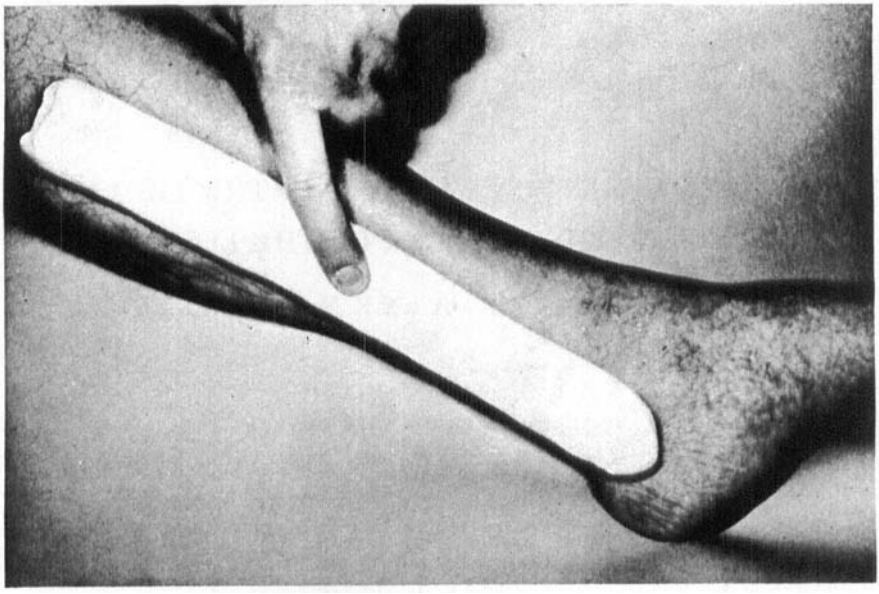

Figure 1. Special compression bandage applied to the leg.

trained staff. This makes it difficult to clean the ulcer and consequently causes a bad smell embarrassing to the patient and his surroundings.

METHOD

At the Department of Orthopaedic Surgery O of the Odense Hospital we have been using a special kind of compression bandage since 1965. It consists of a 20 cm long cylinder of paper crepe, 2 cm in diameter and enclosed in Tubegauze®. After the ulcer has been cleaned it is covered with a thick layer of gauze, but no hydrophobic layer, and no medication. The pad is applied behind the tibia from the tip of the medial malleolus and upwards, viz. on a level with the communicating veins (Figure 1), and the pad is then fixed with an elastic bandage, 8 m in length and 8 cm in width, from the toes to the knee, a particularly large number of turns being applied around the lower third of the leg in order to prevent the bandage from sliding down (Figure 2). After brief instructions the patient is able to apply the bandage himself, and the bandage is left on for as long as possible, i.e. until the turns get loose or fluid from the ulcer oozes through—from a few days at the outset up to 10 days later on. The bandage is kept on during the night. The patient is seen in the out-patient clinic once a month, and when the ulcer has been healed for one month with continued use of the bandage, we have, empirically, the most favourable time for operation, and the patient is admitted for resection of the incompetent communicating veins by the method of Dodd et al. (1957). At the same time the saphenous incompetence is treated surgically, as a rule by stripping.

Figure 2. Special compression bandage fixed with elastic bandage.

MATERIAL

During the period 1965–1971 a total of 41 patients have been treated by this special compression bandage, 14 males and 27 females. One patient was treated on both legs. The material comprises only purely varicose ulcers. Three patients had a history of deep vein thrombophlebitis. There were palpable arterial foot pulses on all limbs.

Figure 3 gives the age distribution and sex ratio. The youngest patient was 30, the oldest 88. Table 1 lists the approximate size of the ulcer in cm^2. The majority were about one cm^2, the largest one 70 cm^2.

Table 1. Area of ulcer.

Area, cm^2 (roughly)	Number of extremities		
	Females	Males	Total
1	12	6	18
2	3	2	5
3	4	1	5
6	4	2	6
12	2	2	4
25	3	0	3
70	0	1	1

Table 2. Healing time of treated ulcers.

Healing time (months)	Number of extremities		
	Females	Males	Total
1	13	3	16
2	5	5	10
3	9	1	10
4	1	4	5
10	0	1	1

RESULTS

All the ulcers healed in 1–10 months, mean 3.2 months, and the majority had healed within 3 months (Table 2).

Of the 41 patients 33 were working during the treatment. Twenty-seven reported partial or complete relief of pain in a few days; 3 had local complaints. There were 3 recurrences of the ulcer, one after the compression treatment and 2 after operation. Of the 41 patients 37

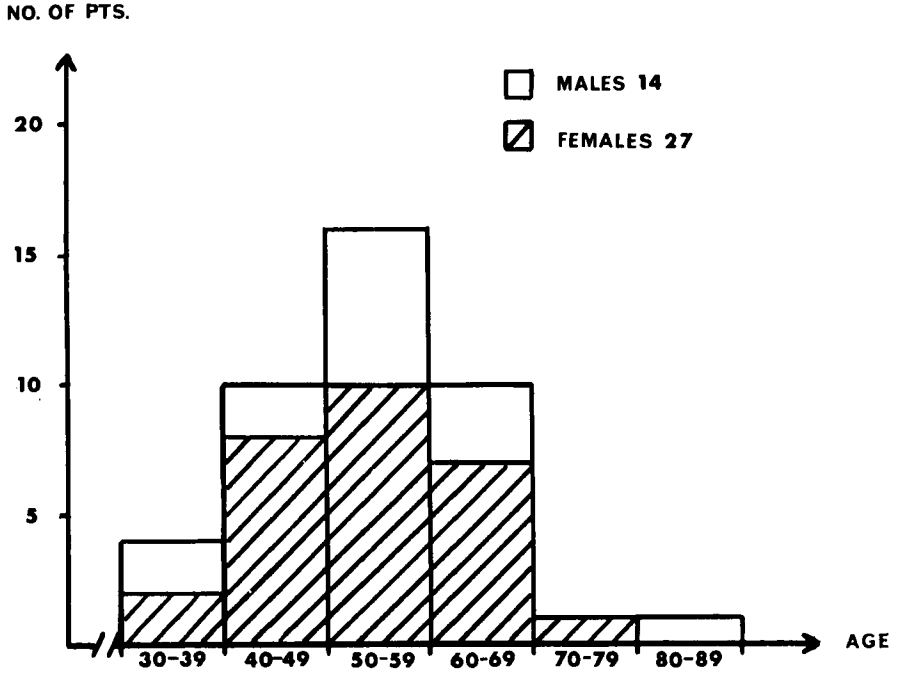

Figure 3. Age distribution and sex ratio of the 41 patients.

were subjected to operation, one refused, and in 3 there were contraindications because of increased operative risk. In all the operated patients the communicating veins were found to be incompetent. A total of 16 patients were overweight, whereas in 25 the body weight was within the normal range.

DISCUSSION

The prerequisite for healing of an ulcer is that the oedema is removed. The compression bandage effectively prevents outflow from the incompetent communicating veins and thereby the development of oedema. Arterial flow improves. It must be expected that the healing time is independent of sex, age, and duration of ulcer. Indeed, there were no statistically significant differences in the duration of ulcer between the two sexes or in the healing time (McWhitney's test: $P > 0.05$) and no correlation between age and healing time ($r = 0.28$). There was also no correlation between the healing time and the duration or size of the ulcer ($r = 0.0$).

As the recurrence rate after completed conservative treatment is high, due to the unchanged pathophysiological conditions the principle must be definitely to treat all patients by radical resection of the communicating veins and operation for saphenous incompetence, provided that their general condition permits this. The smallest number of operative complications occur if the operation is performed about one month after the ulcer has healed, since any inflammatory reaction in the skin and subcutaneous tissue has then as a rule subsided completely.

A special problem is posed by chronic ulcers with firm fibrosis in the surroundings and bed, as this prevents arterial supply to such ulcers. Such cases cannot be treated by the special compression bandage. We excise these ulcers and the entire fibrotic area till healthy tissue is reached and leave the ulcers to granulate before covering them with a split-skin graft about two weeks later.

SUMMARY

Forty-one patients were treated with a special compression bandage for varicose ulcer of the leg. The ulcers were covered with a thick layer of gauze, and a 20 × 3 cm cylinder of paper crepe enclosed in Tubegauze® was placed behind the tibia, whereupon an 8 m long and

8 cm wide elastic bandage was applied as compression bandage from the toes to the knee. No form of medication was applied to the ulcer, and the bandage was changed only if ulcer secretion had oozed through it or the turns had loosened. The bandage can be applied by the patient himself after brief instruction. With this bandage the incompetent communicating veins behind the tibia in the lower third of the leg are compressed. Of the 41 patients 33 were working during the treatment, and the ulcers healed in an average of 3.2 months. Twenty-seven patients reported partial or complete relief of pain in a few days.

Statistical calculations were carried out to assess the efficacy of the special compression bandage. We found no statistically significant difference in the duration of ulcer and healing time between the two sexes, and there was also no correlation between age and healing time, which also showed no correlation to the duration or size of the ulcer. Radical operation for the venous incompetence was carried out when the ulcers had been healed for one month.

REFERENCES

Arnoldi, C. C. (1959) Ulcus cruris venosum konservativt behandlet. *Ugeskr. Læg.* **121**, 914–918.

Bauer, G. & Hæger, K. (1962) Ulcus cruris. *Nord. Med.* **67**, 843–849.

Cocket, F. B. & Jones, D. E. E. (1953) The ankle blow out syndrome. *Lancet* **i**, 17–23.

Dodd, H., Calo, A. R., Mistry, M. & Rushford, A. (1957) Ligation of ankle communicating veins in the treatment of the venous-ulcer syndrome of the leg. *Lancet* **ii**, 1249–1252.

Dodd, H. (1964) Ulceration of the leg. *Brit. J. clin. Pract.* **18**, 555–560.

Gundersen, J. (1965) Underbensbandage. *Nord. Med.* **74**, 1129–1132.

Hansson, L. O. (1964) Venous ulcers of the lower limb. *Acta chir. scand.* **128**, 269–277.

Sjøberg, J. (1965) Konservativ behandling af ulcus cruris varicosum. *Ugeskr. Læg.* **127**, 1508–1510.

Sørensen, K. H. (1964) Surgical treatment for venous insufficiency of the lower limb with severe trophic changes especially leg ulcer. *Acta chir. scand.* **127**, 597–608.

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