

Varicotape: temporary selective varices compression

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Abstract We incidentally hypothesized that placing Kinesio tapes over the bulging varicose veins patients had immediate clinical benefit. Refilling Time prolongation after taping seems the explanation of this effect. Fifteen patients were investigated via a clinical questionnaire and photoplethysmography trying to demonstrate the possibility of this type of temporary selective varices compression as a conservative treatment of varicose veins incompetence syndrome. The results were very encouraging suggesting a rapid divulgation of this simple and cheap method.

Keywords tributary varices, conservative treatment, taping, selective compression, temporary reflux elimination

Introduction

Many years ago, watching the Olympic games we started to see athletes with coloured strips stuck on body parts. Now we know that they were kinesiology tapes and “taping” is the practice of positioning the tapes over body parts.

In 1973, Dr Kase created a therapeutic tape and taping technique giving support to joints and muscles, without restricting range of motion. Kinesio Taping first saw worldwide exposure during the 1988 Seoul Olympics. Since then, Kinesio has become a popular form of muscle taping used by sportsmen and kinesiotherapists professionals across the world. It is indicated to relieve pain or abnormal feeling in the skin and muscles; to support the muscles during movement; to remove congestion of lymphatic fluid or haemorrhages underneath the skin; to correct for misalignments in the joint¹. Millions of users consider Kinesio Tape really a big help, sceptics point to a lack of

scientific evidence. What concerns us here is limited to the material employed (the tapes) and not to the method (Kinesio taping).

A taping proposal in phlebology

During patient’s assessment clinical and instrumental, finger or tourniquet compression may be used for analysing the haemodynamic behaviour of the venous network. In facts, finger or tourniquet obstruction at any point of the refluxing “system” (a “close circle” according to Trendelenburg²) stops the blood reverse flow (eliminates the reflux), although leaving the incompetence anatomy unchanged (the valves remaining incompetent), while the physiologic vein drainage runs in deep veins³.

Venous Refilling Time (RT) calculation by plethysmography for example, employs the tourniquet exclusion of superficial veins when studying the reflux effect on the limb circulation⁴.

While finger or tourniquet compression is a short-term action eliminating the reflux, we considered the hypothesis of creating a similar, but permanent, effect using the taping material.

Made of a latex-free cotton fibre, the tape is water resistant, breathable, and hypoallergenic. The medical grade acrylic adhesive allows for multiple days wearing time without irritating the skin and it is possible to shower with the tape. Different brands are available online for about 2 Euro per meter. Taping is safe, inexpensive and easily found, easy to apply, durable (at least one week), wettable (allowing a shower), easy to remove, not ugly (skin coloured).

While all the parameters requested for the material are satisfied, the effectiveness of this method needs to be ensured. This was done in this study analysing our preliminary empiric experience.

Population and Method

A cohort of 15 patients with varices due to Great Saphenous Vein (GSV) incompetence, that could benefit from the occlusion of a refluxing vein identified by fingers occlusion during ultrasound (US) assessment were enrolled after signing a written informed consent at the Ippocrate Medical Centre in Parma. There were 10 females over 5 males; the mean age was 58 ± 19 ; the CEAP class was C2 in 14 cases, C3 in 1. The most favourable case was considered when reflux completely stopped after a localized finger's compression where the compression is over the incompetent tributary; these are RET (Reflux Elimination Test) positive cases, where the re-entry perforator is centred on the tributary varicose vein⁵. Reflux duration important decrease as in RET negative cases (when re-entry perforator is centred on the GSV) was also a good candidate. Multiple varicose tributaries, diffuse varicosities, anarchic distribution were excluded. Skin induration and oedematous legs were excluded too but could theoretically be considered after resolution by bandages or hosiery.

During one month of activity taping occlusion was then attempted and verified by US by refluxing time reduction. The patients were asked to hold the compression for 7 days for a final clinical verification. Four points Likert scale questionnaires⁶ for 5 symptoms analysis were also submitted for comparing pre and 7 days post treatment. Photoplethysmography (PPG) (Elcat Vasoquant VQ1000 Quantitative Photoplethysmograph Venous Function Diagnostic system Bgm. - Finsterwalder-Ring 27 82515 Wolfratshausen Germany) was performed pre, with lace, and at 7 days after taping⁷. Complications and adverse effects and negative results were recorded. The study was considered as an extension of the diagnostic procedure and consequently no Ethics Committee was involved in this initial set-up phase.

Taping methods

If possible, the whole course of the varicose tract, from the reflux origin to re-entry point/s should be covered. (Fig 1)

The origin corresponds usually to the junction of the tributary with the saphenous stem; the re-entry point/s to a perforator/s.



Figure 1 - 5 cm large tapes are placed along the varicose veins pathway, with transversal positioning over feeding and re-entry points.

Tapes 5 cm large, can be cut in pieces about 10/15 cm long and applied in succession with small superimposition. At time transversal position may be appropriate, particularly at the tributary reflux origin. Tape's tissue is sufficiently smooth to allow knee flexion without discomfort. Skin hairs should be previously erased and the skin should be dry and clean before taping. After positioning of the tapes a short period of hand compression over the tapes will help for a perfect adherence. A compression hosiery can be overlapped if appropriate in more advanced cases (Fig 2).

Immediate ambulation is allowed.



Figure 2 - Taping material is smooth and it may cover knee varices (a) allowing free movements (b); if needed, a compression hosiery can be overlapped (c).



Figure 3 - A dental roll may be used for providing local greater compression as for perforators.

A thickness of cotton (i.e. dental roll) may be placed under the tape in points where greater local compression must be delivered (SFJ, saphenous stem, perforator). (Fig 3)

Tapes removal is easy, despite the high adhesivity, but can subject the skin to an annoying tension; however, removal can be facilitated by the application of an industrial acrylic remover or, more simply, acetone.

A sticky residue can sometimes remain on the skin, being hardly removed by washing, whilst it is also eliminated with acetone.

Results

In all the 15 cases taping was easily accepted and well tolerated; in no instance the taping needed to be removed. Measurements below are reported as mean $\pm$ standard deviation. Clinical scoring measured through the Likert scale based on 4 points (0-absent, 1-moderate, 2 severe, 3 very severe) over 5 symptoms (heaviness, pain, cramps, paresthesia, oedema) comparing basal status ($3,7 \pm 1,3$) with the 7 days treatment demonstrated a constant amelioration in 14 cases, one case remaining unchanged. ($1,4 \pm 1,2$; $p < 0,001$) (Fig 4)

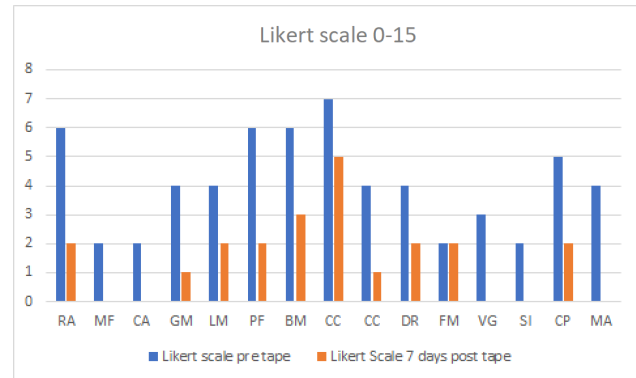


Figure 4 - Result of clinical questionnaire based on 4 points Likert scale of 5 symptoms and signs as heaviness, pain, cramps, paresthesia, oedema. (7 days column is absent when 0 score) ($p < 0,001$).

PPG (Fig 5) showed an immediate significant Refilling Time (RT) lengthening just after tape placement from $16 \pm 6s$ to $26 \pm 8s$; this effect remained unchanged after 7 days with $27 \pm 10s$; $p < 0,01$.

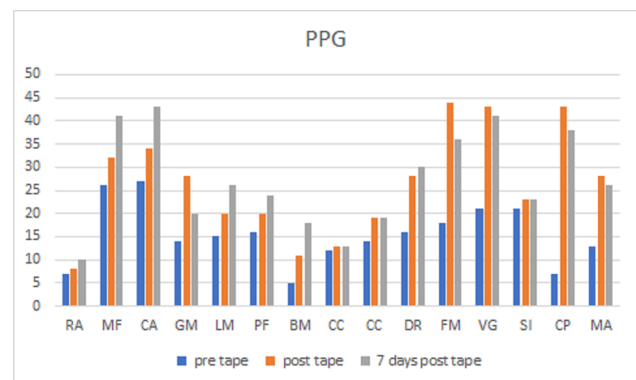


Figure 5 - PPG refilling time (pre, immediate post, and 7 days records), showing a general positive effect.

In 9/15 cases there was a normalization ($> 20 s$), a partial lengthening in 3 cases; 2 cases instead had no RT relevant change (RA, CC cases in the Fig 5). Interestingly, both these failures of RT prolongation showed a significant clinical improvement (RA,CC cases in Fig 4).

No skin irritation or allergic reactions have been recorded at 7 days control.

Discussion

A cohort of 15 cases has been observed in this preliminary study with the aim of presenting a new method for varicose veins temporary conservative treatment (Varicotape) by selective temporary, although durable, compression.

Compression of the skin over a dilated vein closes the same vein. At that point no flow is possible in the vascular

bed directly unless another re-entry pathway is present. This peculiar behaviour is studied during Ultrasound assessment of varicose veins patients using finger compression for understanding some aspects of the pathologic network. The placement of a tourniquet (or of an inflatable cuff) may be used to exclude the flow in the varicose veins, but without any selection, acting circumferentially over all the veins. The traditional use of a bandage or of a hosiery obtains a compression of the whole area covered by the tissue but has the well-known disadvantage of a difficult compliance.

In this initial study we observed that the compression of the limited area where the varices are displayed by a particular adhesive tape commonly employed in Kinesio-therapy (we called it Varicotape) is able to obtain a partial reduction of the varicose volume (the blood pooled in the varices) in static position, and to lengthen the refilling time (time to fill the venous network) during ambulation. As a consequence, the venous hypertension ligated to the venous reflux is reduced or eliminated, together with related symptoms. This effect has been observed clinically by the subjective improvement of symptomatology reported by patients (through a questionnaire) and confirmed by ultrasound observation when unhindered by the tape (reflux time reduction or disappearance) and photoplethysmography (RT prolongation).

Taping over varices could be compared to a “virtual phlebectomy. A similar suggestion (CREED – Compression Reflux Elimination Device)⁵ was recently issued, proposing to selectively compress only the varicose tributary junction with the saphenous stem by taping or tourniquet positioning, so stopping the reflux both in the same GSV as in the tributary, but leaving the saphenous orthograde flow.

The case with no clinical amelioration (FM case) curiously showed a very good immediate RT recording (44 s). One of the two cases that had no RT amelioration is the C3 case (RA case), possibly because oedema caused hindrances. The mechanism by which clinical improvement was observed in two cases (RA and CC cases) despite failure of RT prolongation is not clear, possibly linked to the “original” Kinesio-therapy effect over pain (although still unexplained)¹.

The key factor which allows the described result to be achieved is due to the use of the adhesive tape (Varicotape), classically made by soft cotton strips with adhesive acrylic glue, water resistant, breathable, and hypoallergenic that can be worn for several days at a time. The skin-like colour of the tapes suggested has a limited aesthetic impact, especially if a light stocking is used as covering. This could limit the use of heavier stockings notably hated by the great majority of female patients.

The suggested material has a very low cost and is very easily self- placed, once adequate instructions are given to the patient. The tape positioning on varicose network has an indication as a temporary treatment when active treatment of varices is contraindicated (old age, comorbidities, acute disease, fear, refusal, logistics deficiency) or must be delayed (i.e.: hot weather, waiting list, inflammation, infection).

Bulging superficial varices are those that are best compressed by taping. When deeper veins (i.e., saphenous veins sub fascial placed) ought to be compressed, a stronger pressure would be needed by the taping method. In these cases, a thickness of cotton (i.e. dental cotton rolls) may be used under the tape, placed exactly over the vein site, creating a local augmented pressure condition.

We did not observe any skin unwanted reaction at all.

Possible Indications for Varicotape

1. Tributary varices
2. saphenous axis (Fig 6)
3. junction/groin (Fig 6)
4. perforator

Progressive knowledge of the Varicotape effect could suggest further applications as:

- partial covering of the varicose network could give same effect than total covering, if the varicose vein trunk closure is complete (interruption of the “close circle”). At the limit, compression localized to the tributary junction with the saphenous stem could be sufficient to stop the reflux in the same GSV⁵.
- taping after sclerotherapy may avoid skin bruising and enhance efficacy
- healed ulcer’s site may be protected from skin micro trauma
- post phlebectomy taping may accelerate absorption of bruising and avoid bandaging
- in arteriopathy subjects in whom bandaging is problematic, taping may be used instead when a leg compression covering is needed
- skin induration in long standing CVI patients may be selectively and effectively compressed under bandages or hosiery
- pelvic reflux feeding leg varices can be blocked by taping at the groin
- varicose network can be “prepared” for subsequent ablation by pre-op calibre reduction
- reduction of venous system overcharge in pregnancy waiting for delivery
- faster recalibration of the dilated tributary veins after conservative surgery.



Figure 6 - Saphenous-Femoral junction and GSV stem, although deeper positioned, may anyway benefit from taping occasionally augmented with a cotton thickness

This is a preliminary study with limitations in the number of clinical cases and in the amount of available data for research; in particular, a control group comparison with elastic stockings will be needed when a scientific trial will be done based on this kind of taping. Here we just observed a curious original phenomenon, even if stockings effect is well known while taping effect is

new and probably is not the same as stockings. However, due to the great apparent results of this simple taping application, we thought appropriate to quickly divulgate the idea, waiting for more personal (or other's) observations.

Conclusions

Using simple and inexpensive material it seems possible to reduce the hypertension effect of varicose veins for patients waiting for correction, refusing correction or not able to be treated. It can be considered as a temporary conservative treatment waiting for a more durable procedure, but it could have also a prolonged use in selected cases, allowing consequent direct GSV sparing.

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