Velcro Compression Devices

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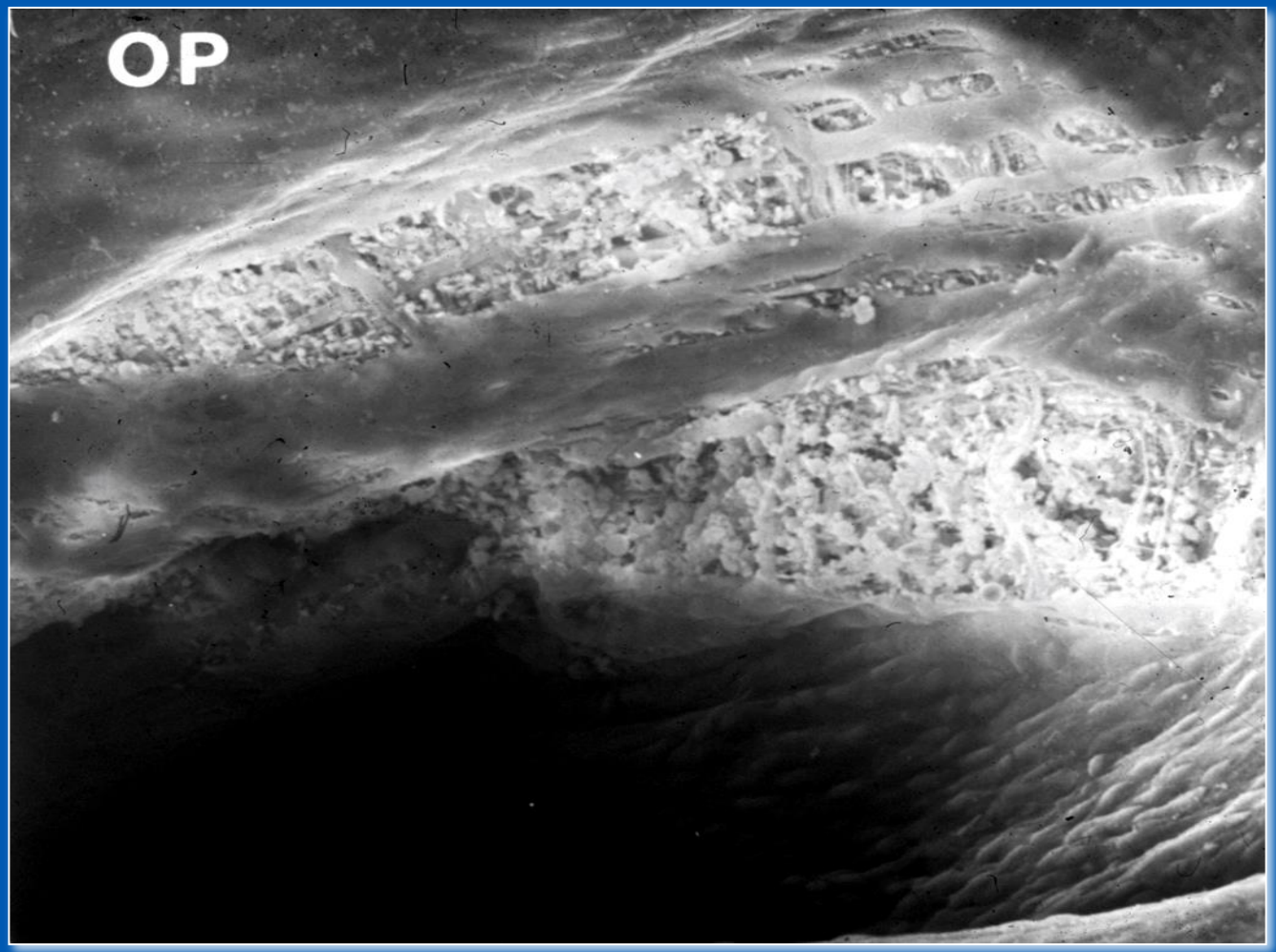
Leg Swelling

Obstruction of the veins or refluxing blood may cause increased pressure at the venous end of the capillary

- Flow through the capillary slows and the vessel dilates
- Eventually over-distention of the capillary causes endothelial cracks.
- White cells adhere to the crack along with activated hemostatic elements

Endothelial Damage From Venodilatation



Comerota, AC in Rutherford's Textbook of Vascular Surgery, Fourth Edition (WB Saunders Co., Phila. 1995) Figure 134-4(B), page 1793.

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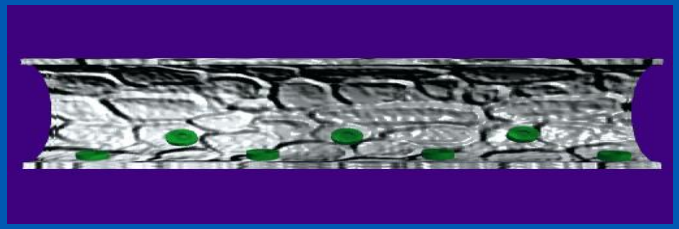
Endothelial Damage From Venodilatation

Comerota, AC in Rutherford's Textbook of Vascular Surgery, Fourth Edition (WB Saunders Co., Phila. 1995) Figure 134-4(B), page 1793.

Leg Swelling

- This process eventually results in total obstruction of the involved capillaries
- No longer is there exchange of nutrients and waste products through the capillary membrane so the areas normally supplied by the capillaries become ischemic
- Tissue necrosis may slowly occur resulting in mummification or skin ulceration
- Cellulitis and also thrombosis in the leg can occur



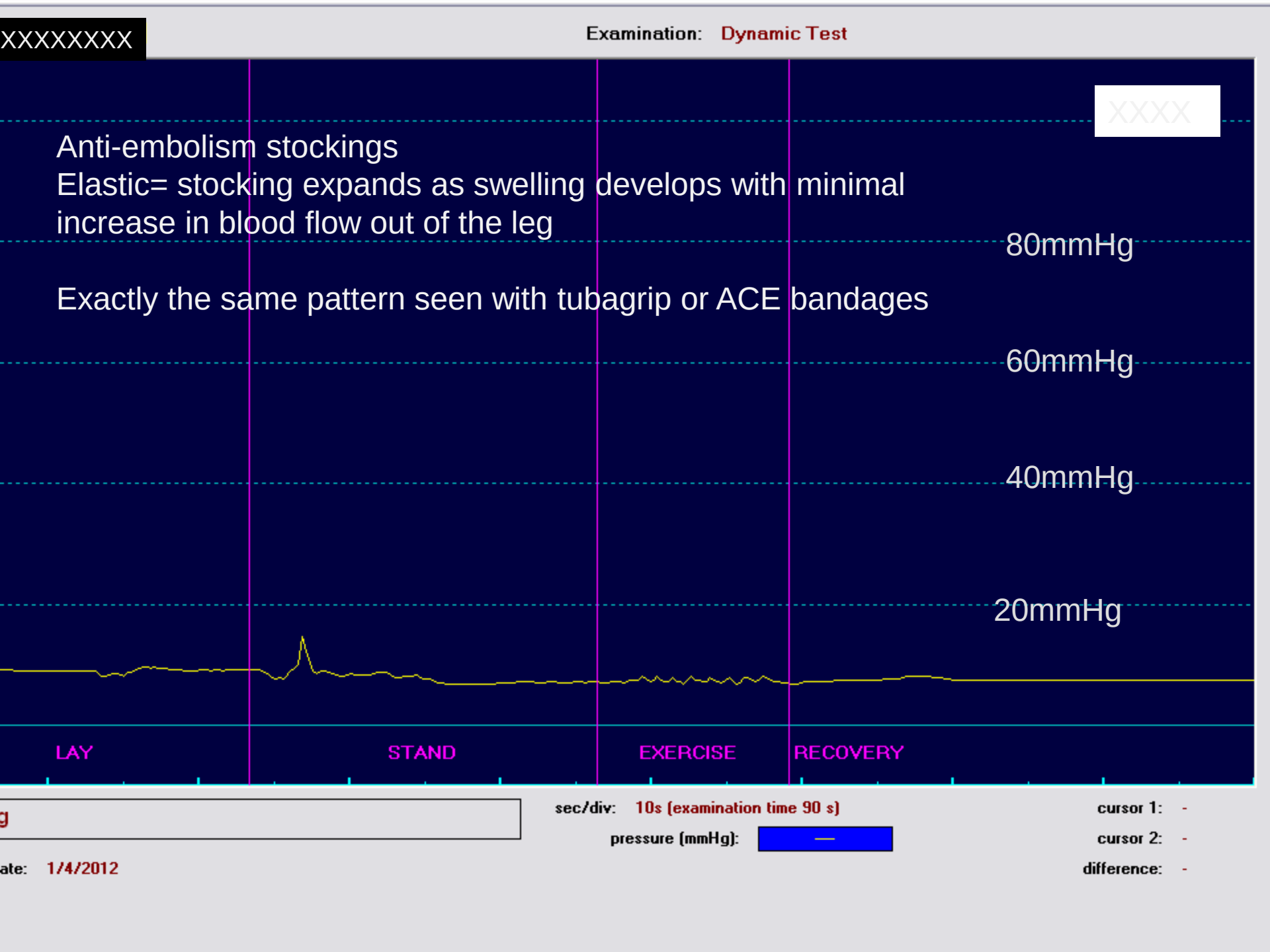
Swelling ⇨ venous stasis ⇨ endothelial disruption ⇨ ulceration

Stocking Failure

Elastic (Long Stretch) Compression

- High resting pressure
  - -Uncomfortable over time
- Low ambulatory pressure
  - -Bandage “gives way“ walking
  - -Edema increases
- SSI <10mmHg*

*Static stiffness index (SSI)


XXXXXXXX
Examination: Dynamic Test
XXXX
Anti-embolism stockings
Elastic= stocking expands as swelling develops with minimal increase in blood flow out of the leg
Exactly the same pattern seen with tubagrip or ACE bandages
80mmHg
60mmHg
40mmHg
20mmHg
LAY
STAND
EXERCISE
RECOVERY
sec/div: 10s (examination time 90 s)
pressure (mmHg):
cursor 1: -
cursor 2: -
difference: -
ate: 1/4/2012

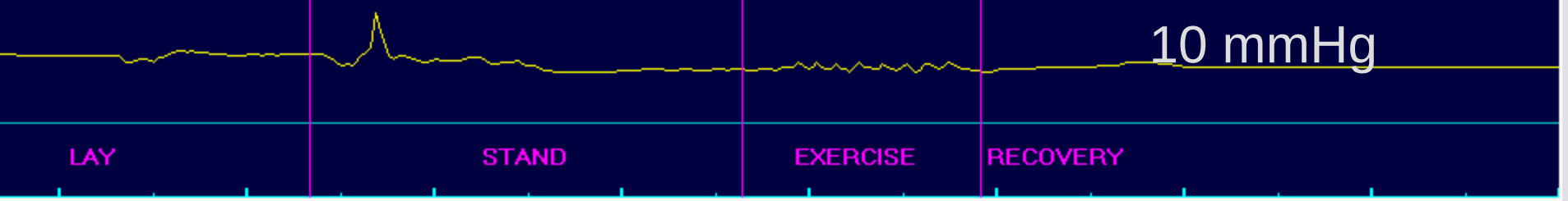
APRINI JOSEPH

Examination: Dynamic Test

XXXX

Graduated compression surgical stocking

No change in pressure on leg resulting in little to no increase in venous outflow



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sec/div: 10s (examination time 90 s)

pressure (mmHg):

cursor 1: -

cursor 2: -

difference: -

ate: 1/4/2012

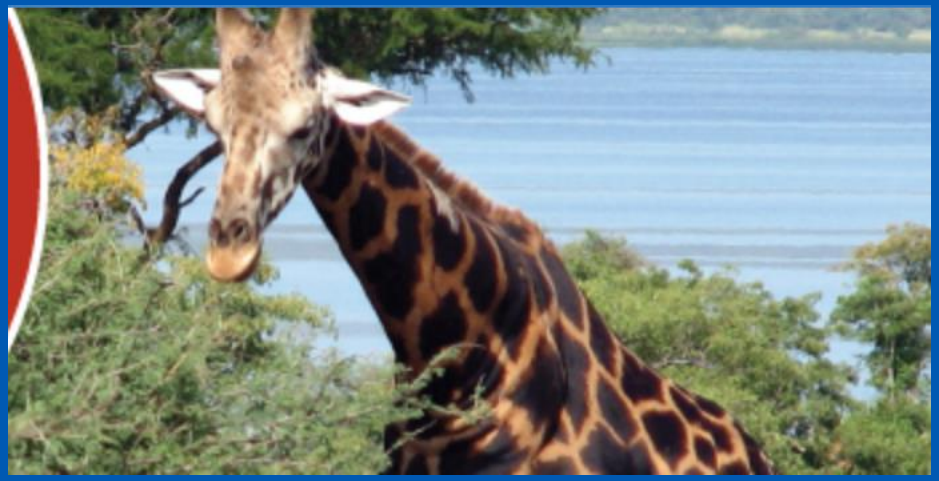

Examination: Dynamic Test
Elastic stocking 20-30mm Hg
60 mmHg
40 mmHg
20 mmHg
Pressure on leg decreases with activity resulting in little to no increase in venous outflow
sec/div: 10s (examination time 90 s)
pressure (mmHg):
cursor 1: -
cursor 2: -
difference: -
F1=Batt
F4=Start
F5=Sav
F6=>Tra
F9=Prin
F10=Sc
ENTER=S
Home=M
SPACE=S
ESC=E

Inelastic (Short-Stretch) Compression

- Low resting pressure
  - Comfortable at rest
- High walking pressure
  - Edema decreases
  - SSI > 10mm*
- Modalities include Unna's boot, short stretch bandages, and velcro devices

*Standing stiffness index

Velcro Compression



Most people are unaware that giraffes have venous pressures of more than 250 mmHg at their ankles. That is three times more than humans. However, giraffes do not suffer from lymphedema or venous disorders.

Physiologists have discovered the answer is in the skin. Giraffe skin is inelastic, so it does not stretch. As their leg muscles contract the veins in the legs are squeezed forcing the blood toward the heart. Thus, giraffes are not susceptible to problems like lymphedema and venous disease, even though they may be on their feet 24 hours a day.

www.CircAid.com

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Velcro Compression

- Devices utilize short-stretch material
  - Features a low resting pressure providing comfort at rest
  - Achieves a high working pressure with exercise
    - As the muscles contract blood is forced out of the leg since the bandage does not “give way”
    - This results in decreased residual venous volume and edema producing a decrease in leg circumference
    - Static stiffness index of greater than 10 which is ideal for treating edema

Velcro Compression

- Consists of a series of velcro straps that encircle the extremity
- Donning and doffing are extremely fast and efficient
  - Advantages include being able to tighten the device if loosening occurs due to edema reduction, or loosening the device if pain, tenderness, numbness, or other compression-related symptoms occur
- Usually worn over a light stocking or hybrid liner, with only foot compression, to facilitate application of the stocking

Velcro Compression

- Ready to Wear & Made to Measure options
- Inelastic properties SSI- >10
- Laminated fabric construction
- Adjustable compression levels
  - 20-30 mmHg
  - 30-40
  - 40-50
  - 50+

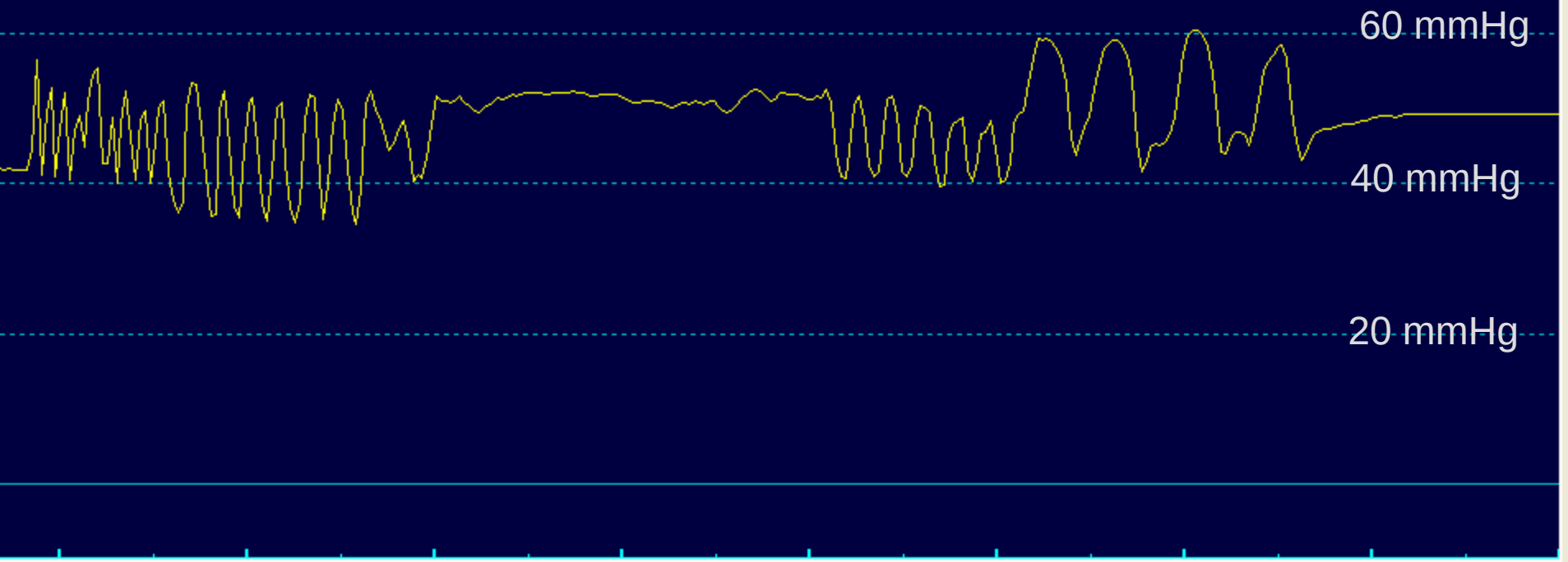
APRINI JOE

Examination: Dynamic Test

[redacted]

Velcro Appliance System

Note the marked difference between resting and ambulatory pressure. Dramatic edema reduction will result. This device can be used as a wound compression dressing, can be changed daily, and shortens healing time.



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sec/div: 10s (examination time 90 s)

pressure (mmHg):

cursor 1: -

cursor 2: -

difference: -

ate: 05.11.2011

Velcro Compression Devices

Indications

- Patient having difficulty donning or doffing devices due to some or all of the following problems
  - Age
  - Weakness
  - Arthritis in hands, shoulders etc.
  - Obesity or advanced pregnancy
  - Restricted mobility
  - Lymphedema
  - Edema uncontrolled with conventional stockings
  - Leg wounds where treatment with compression bandages not tolerated or feasible

Indications II

- Patients having joint replacement who have preoperative swelling or venous insufficiency
- Patients with more severe leg swelling uncontrolled with conventional support stockings
- Patients with advanced degrees of swelling including lymphedema or the venous stasis syndrome due to obesity
- Patient after leg surgery where stockings cannot be properly donned or doffed

Clinical Experience I

- Patients with a large abdominal girth have increased leg venous pressure due to the increased intra-abdominal pressure which may exceed 50mmHg in some patients
- The standard 30-40mm Hg stockings are unable to reduce swelling, pain, and discomfort
  - Extremely difficult to apply and remove
  - Increase leg discomfort due to their elastic properties
  - Poor patient compliance results increasing leg swelling, venous stasis, and increased skin fragility

Venous Stasis Syndrome

Venous Insufficiency Induced Lymphedema

Venous Insufficiency-induced Lymphedema After Treatment With Velcro Devices And Lace Shoes

Patient is 95 years old:
Six months using Surgical hose (TED)

Velcro devices prescribed after 1 wk compression bandages

Velcro Appliance Over Farrow Hybrid liner*

Ankle Sleeve Used To Control Swelling

*The Farrow hybrid liner is a stocking with 20mmHg foot compression and negligible leg compression to aid donning and doffing. It serves as a liner under the velcro appliance to protect the skin and along with lace shoes helps prevent foot swelling.

Adjunctive Measures

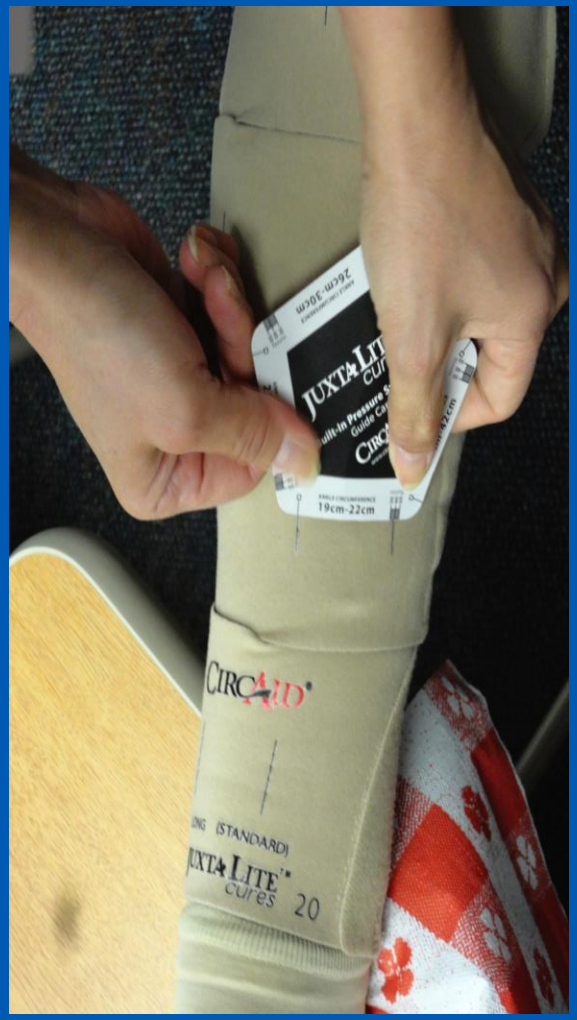
- Foot Compression
  - » specially designed velcro foot piece used when significant foot swelling is present
  - » Hybrid stockings *
    - – features 20mm Hg foot compression but negligible leg compression
    - – This facilitates donning and doffing of the stocking
  - » Stockinette under liner may be used for when skin lesions are present
  - » Light stocking can supplement the effects of leg compression
  - » Ankle sleeve may be necessary to control ankle swelling in some patients
  - – Lace or Velcro strap shoes limit foot swelling

*Farrow, USA

CirCaid Cure

- These devices are particularly useful in patients with healing venous stasis leg ulcers instead of using compression bandages
- They can be removed for wound cleansing and reapplied to exact leg pressures without special expertise
- They can be fitted in the office without the need for sending the patients to be measured at an outside facility
- In some cases they may have economic advantages

CircAid Cure

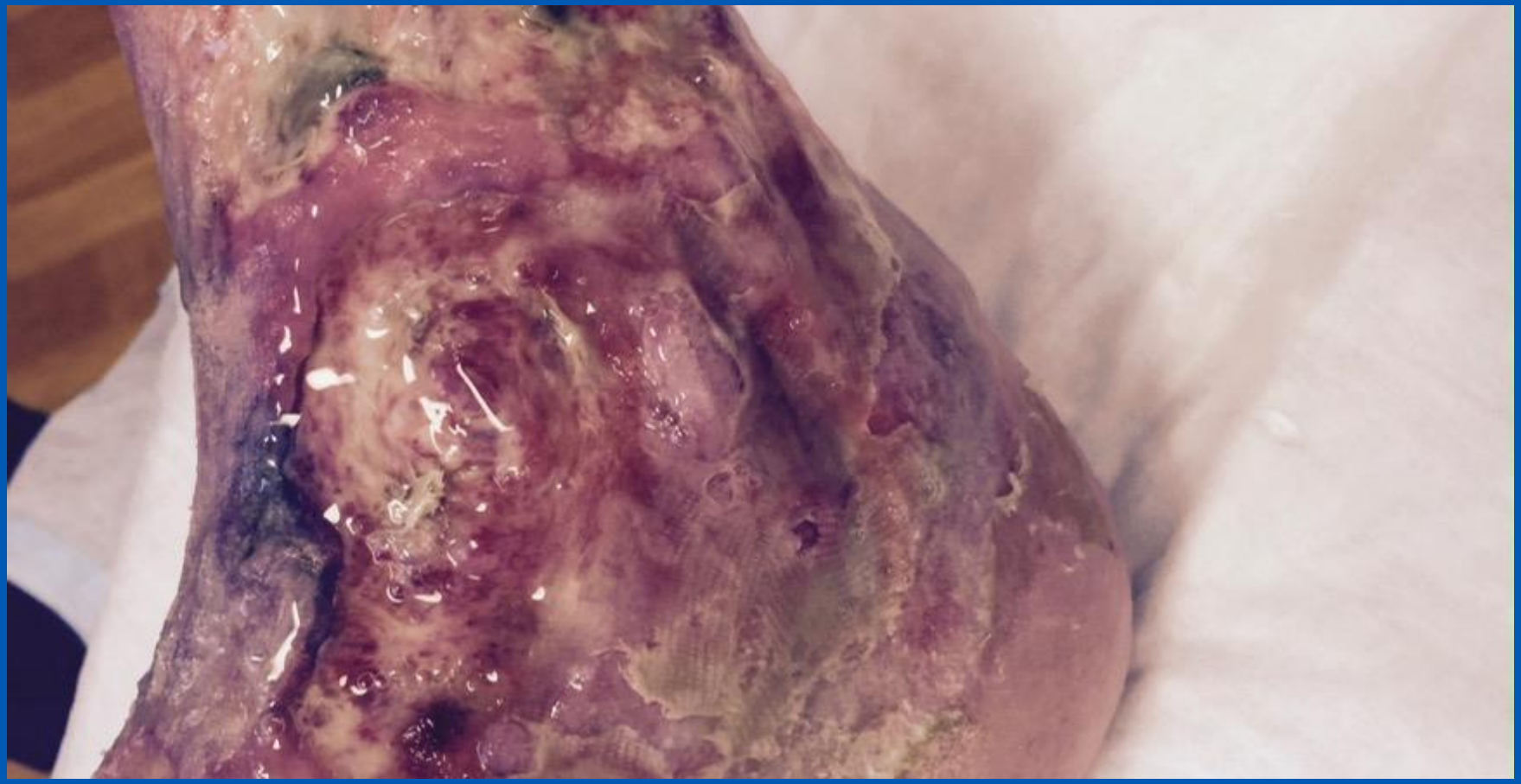


Leg Lesions Suitable For Velcro Instead of Bandages

Patient Is 89 Yr. Old With A Leg Ulcer Since 8-19-13

- Patient made an uneventful recovery and the pain with compression stopped dramatically
- The ulcer began to heal and is decreased approximately 75% over the next 4 weeks
- Apligraf applied 4-3-15 to accelerate closure.
- Drainage from the wound decreased by 80% once the ablation was done.
- Once the patient healed use of the velcro device maintained a healed wound indefinitely

Wound 1-27-15 (7 Days Post Ablation)



Wound 3-31-15 (6 weeks Post Ablation)

Healed Wound 9-1-15

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Healed Wound 9-1-15

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Venous Insufficiency Wound

- Patient was a 43 yr. old recovered addict with morbid obesity
- The wound required nearly one year to heal using short stretch compression and eventual grafting
- Patient placed in velcro compression for long-term care
- No recurrence observed during 2 year follow-up

Lateral Ankle

Lateral Ankle – Healed over one year later

Long-Term Care

- The follow-up once ulcer healing has been achieved is maintained with velcro devices
  - Many of these patients are aged and cannot properly don and doff 30-40mm Hg stockings
  - Arthritis or extreme overweight may precude use of stockings
  - Maintaining wound healing with velcro devices is an important ongoing tactic to prevent recurrence.
  - These devices were used successfully in the following patients

Ulcer healed once venous ablation was performed and velcro applied for long-term

Obese patient successfully used velcro device following ulcer healing

Mixed Arterial & Venous Insufficiency

- Patients with reduced ankle pressures and swollen legs
  - Velcro devices are ideal providing low resting pressure and high working (walking) pressure
  - Easily adjusted to tighten or loosen depending on patient tolerance (pain, numbness, tingling, etc)
  - Can be used for most of these patients as long as the resting pressure is less than the systolic pressure at the ankle
- Arterial inflow may increase as blood is pumped out of the leg temporarily improving leg perfusion

Conclusions

- ***Velcro appliances should be considered in patients who fail standard support stockings***
  - ***Non compliance due to donning/doffing issues***
  - ***Failure to control swelling***
  - ***Morbidly obese patients***
  - ***Patients with arthritis or reduced flexibility***
  - ***Most patients over 75-80 years of age***
  - ***Patients with mixed arterial and venous insufficiency***
  - ***Alternative to compression bandages for selected leg wounds***


THE END