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Non-Pneumatic Anti-Shock Garment

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ABSTRACT

A comparative research study was conducted to establish its effectiveness in reducing maternal mortality & morbidity due to obstetric hemorrhage in Egypt. A recently published analysis on 1442 women, examined the effect of the NASG on women suffering from obstetric hemorrhage. In spite of worse condition primarily, negative outcomes were significantly reduced in the NASG phase: that means the blood loss decreased from 444 mL to 240 mL ($p<0.001$), maternal mortality decreased from 6.3% to 3.5% (RR 0.56, 95% CI 0.35–0.89), severe morbidities from 3.7% to 0.7% (RR 0.20, 95% CI 0.08–0.50), and emergency hysterectomy from 8.9% to 4.0% (RR 0.44, 0.23–0.86). In multiple logistic regression, there was a 55% reduced odds of mortality during the NASG phase (aOR 0.45, 0.27–0.77). The number needed to treat (NNT) to prevent either mortality or severe morbidity was 18 (12–36).

Keywords: non-pneumatic, anti-shock garment

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INTRODUCTION

NASG is a low technology first aid device which is used to treat hypovolemic shock. Its effectiveness for reducing maternal deaths due to obstetrical hemorrhage is being researched. Obstetrical hemorrhage is the term used for heavy bleeding of a woman during or shortly after a pregnancy. Many women in resource poor settings deliver far from health care facilities. Once hemorrhage has been identified, many women die before reaching or receiving adequate treatment [1].

The NASG is a lightweight neoprene garment that is made up of five segments wrapped around a mother's legs, pelvis and abdomen that close tightly with Velcro straps. The garment, called "non pneumatic" since it does not use air and applies pressure to the lower part of the body, forcing blood to key organs of the body including the heart, lungs, and brain [2].

The NASG was adapted from the PASG by the National Aeronautics and Space Administration (NASA) in 1971, when the

NASA/Ames Research Center developed a prototype pressure suit designed to protect hemophiliac children from bleeding in elbow and knee joints by straightening and compressing the joint until medical facility arrives. [3].

Definition

It is an external pressure suit used to stabilize a woman experiencing bleeding after delivery of a baby.

Suggested Protocol for Using the NASG

- The NASG isn't prescribed for use with a reasonable hatchling, for patients with mitral stenosis, congestive heart disappointment, aspiratory hypertension, or in clinical conditions where there could be bleeding sites above the level of the diaphragm.
- The authors recommend cardiovascular resuscitation using limited crystalloid infusion with the goal of 'permissive hypovolemia'26–30. This means infusing 1000–1500 ml of saline rapidly followed by a slower rate of infusion, 150 ml/h, to achieve a mean arterial pressure of about 60 mmHg (blood pressure 80–50 mmHg) and urine output of 30 ml/h.
- Supplemental oxygen should be given until the patient is resuscitated, the hemorrhage arrested, and the circulation fully normalized.

Benefits

This garment provides an improvement over existing products.

- Validated
- Low-cost (US$160.00 per garment)
- Washable and reusable (at least 50 times)
- High-quality garment.
- Comfortable
- This is accomplished by giving direct access to qualified producers who can supply the article of clothing at the cost of US$54 (buyer is in charge of cargo forward from China and import regulations, minimum order is 1,000 units).
- It doesn't should be evacuated for uterine examination or vaginal techniques with stomach part as it were being opened for abdominal surgery. Upon application a patient's vital signs are often quickly restored and consciousness regained.
- There are no pumps, tubing, or gauges to add complexity and risk of malfunction.
- Patient's imperative signs are reestablished and if confounded or oblivious, their sensorium by and large clears.
- It is utilized to transport ladies on a rescue vehicle or to settle a lady holding up blood transfusion in hospital.
- It reverses hypovolemic shock resulting from obstetric hemorrhage & has proven effective in stabilizing patient for upto 3 days.
- Another potential benefit for the use of the NASG for obstetric hemorrhage in low resource settings is that persons with no medical background can learn to apply the garment safely with minimal training. Such training includes hands-on practice in application and removal of the NASG, takes approximately 1 h.
- The use of the NASG might contribute to decreased maternal mortality and morbidity [2].

Operating steps

(1) Place NASG under woman
(2) Close segments 1 tightly around the ankles
(3) Close segments 2 tightly around each calf
(4) Close segments 3 tightly around each thigh, leave knees free
(5) Close segment 4 around pelvis

(6) Close segment 5 with pressure ball over the umbilicus
(7) Finish closing the NASG using segment
(8) 6. Segments 1, 2, 3 can be applied by two persons simultaneously where as segments 4, 5, 6 should only be applied by one.

How it works

It applies circumferential counter pressure on the lower body & uterus which increases circulating blood to the heart, lungs & brain & decreases the rate of blood flow in the abdomen & pelvis, thus decreasing blood loss.

With the bleeding slowed and the blood the pressure restored, panic levels decrease, and there is time to deliberately assess the situation.

Patients can remain in stable condition for hours while blood transfusions are initiated and arrangements made for surgery or other required therapies.

The patient and her family can be given emotional support and prepared for transport to a referral-level facility or any required surgical procedures [3].

Use and maintenance

User: Family member, nurse, midwife, physician, technician. It can be applied by anyone after a short simple training.
Maintenance: Hospital orderlies are generally responsible for cleaning. Cleaning is another challenge. There is no settled strategy for precisely following the quantity of employments and cleanings, accordingly it is difficult to identify when sufficient degradation has occurred to retire the NASG and replace it with a new one [2].

Environment of use

NASG size: Minimum order size is 16 NASG.
Setting: At home and in health care facilities in rural or urban settings.
Requirements: Water and bleach for cleaning.
Product specifications Life time: Approx. 40 uses.
Currently sold in: United States of America. Also, device is ready for manufacturing and sale in China.[3]

Application of the NASG

The technique used for application is for one person to stretch the neoprene panels with all their strength and fasten them with the Velcro as tightly as possible. The lowest (ankle) segment is applied first and the abdominal segment last. If the woman experiences difficulty breathing, the abdominal panel should be loosened slightly, but not removed. Although, if dyspnea continues, the NASG should be removed and the cause of the respiratory problem evaluated. A woman with normal cardio-respiratory function should experience no problems with ventilation. When the patient is steady, there must be a determined assessment for the particular source and cause of the blood loss. On the off chance that pelvic examination or vaginal methods are required, the NASG ought to be left set up; if laparotomy is necessary, open the abdominal segment. Often there will be a drop in blood pressure when this panel is removed; this should respond to additional saline infusion [1, 4].

Removal of the NASG

- The NASG can be evacuated when the hemoglobin level is > 7 or the hematocrit 20%, the beat < 100, and the systolic weight > 100 mmHg.
- Remove segment 1 & wait for 15 min.
- Check pulse & respiration.
- If pulse rate is increased >20BPM / BP falls by 20 mmHg – reapply segment 1.
- If vitals stable, remove segment 2.
- Follow same principles till removal of segment 6.

Storing of NASG

(1) Clean it with running water & disinfectant & dry.
(2) Keep the folded NASG in clear plastic bag.
(3) Store it in a place where it is visible & accessible.
(4) Always store at same place & ensure ever 1 knows its place of storage.
(5) Storage place should be displayed prominently.

CONCLUSION

It can possibly spare lives where separation to a sound office is the contrast between life and passing in the event that it is moderate, accessible and open and if health workers receive training in its use. This kind of innovation and the one of a kind coordinated effort that made it conceivable – is critical to making access to lifesaving answers for ladies around the globe. Till date, it has been utilized on over 10,000 women in 33 countries.

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