Tight Swimming Trunks to Prevent Post Scrotal Surgery Hematoma

An Experimental Justification

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Purpose: To conduct a study to measure the pressure effects of the different scrotal supports applied on a simulated expanding scrotal hematoma.

Materials and Methods: We created a model of an expanding hematoma with simultaneous pressure recording using a urodynamics system. Pressures were recorded independently first without application of any support. Then, three types of scrotal supports were tested, including Euron Net Knickers, scrotal suspensory bandage, and tight swimming trunks brand Speedo® brief and shorts. Subsequent pressures were recorded using the model created, which was applied inside the supports worn by two male volunteers A and B.

Results: Without any external compression, the pressure inside the simulated expanding hematoma "balloon" reached a maximum of 15 cmH_2O. The pressures measured whilst wearing "Netelast knickers" in both subjects A and B reached a maximum of 15 cmH_2O suggesting that this garment exerted no measurable compression. The suspensory scrotal support was then tested in both subjects. As the balloon started to fill with saline, the simulated hematoma pushed the scrotal support forward resulting in falling of the balloon outside the scrotal support. Subsequently, Speedo® briefs and shorts were tested. With Speedo® briefs, maximum filling pressures of 49 cmH_2O and 40 cmH_2O were reached in subjects A and B, respectively. When using Speedo® shorts, however, maximum pressures of 55 cmH_2O in subject A and 54 cmH_2O in subject B were reached at the end of the balloon filling to 300 mL of saline.

Conclusion: The use of tight swimming trunks (Speedo®) has led to satisfactory results in the prevention of hematoma post scrotal surgery.

Keywords: scrotum, hematoma, injuries, wounds, testis

INTRODUCTION

Hematoma following scrotal surgery is a well recognized complication and can be associated with significant morbidity due to discomfort, disability, and psychological distress. The reported incidence of scrotal hematoma following surgery varies in different studies. Some found an incidence as low as 0.3%[1] while others reported the incidence as high as 17%.[2] Several techniques have been described in the literature to minimize the risk of bleeding associated with scrotal surgery. A number of studies were performed using different methods of compression applied to the scrotum in an attempt to prevent hematoma formation.[1,3-10] In practice, these methods of scrotal compression include "Netelast Knickers", suspensory scrotal support, and scrotal bandaging. However, no study has attempted to measure the pressure exerted on the scrotum by these different techniques.

We doubt that any of these scrotal supports exert enough pressure around the lax scrotum to prevent hematoma collection. In our clinical experience, the use of tight swimming trunks (Speedo®) has led to satisfactory results in the prevention of hematoma post scrotal surgery. We set out to test the physiological basis of this method by conducting a study to measure the pressure effects of the different scrotal supports on a simulated expanding scrotal hematoma.

MATERIALS AND METHODS

We created a model of an expanding hematoma with simultaneous pressure recording using urodynamic system Duet ® Logic G2, Medtronic Inc, Minneapolis, USA.

A Condom Ultrasound Probe Cover, FP Sales Ltd, Gwent, UK, was tightly taped and further secured with a suture knot to a 10 French double lumen urethral pressure profile catheter (Digitimer Ltd, Welwyn Garden City, UK) (Figure 1). This catheter was attached to the urodynamic machine giving a baseline filling rate of 60 mL per min filling the balloon to 300 mL of normal saline while the pressure readings were recorded on a computer system using Medtronic Duet Logic system V8.61, USA.

To ensure that the compliance of the balloon alone was low, this model was initially tested without applying any external pressure. The total pressure rise under these conditions was 15 cm H_2O (Graph A). The three types of scrotal supports used in this study were: "Netelast knickers" (Figure 2A), suspensory scrotal support (Figure 2B), and tight swimming trunks Speedo® brief and shorts (Warnaco Group, Inc, USA) (Figure 2C).

Figure 1. The simulated expanding hematoma.

The empty condom attached to the double lumen urethral pressure profile catheter was placed in direct contact with the scrotum of two volunteers (A and B) while wearing the different types of scrotal supports (Figure 3). The condom was then filled with normal saline as before. The pressures exerted on the filling condom from different scrotal support methods were recorded.

RESULTS

Without any external compression at a maximum of 300 mL filling, the pressure inside the simulated expanding hematoma "balloon" rose to a maximum of 15 cmH_2O (Graph 1A). The pressures measured whilst wearing "Netelast knickers" in subjects A and B reached a maximum of 15 cmH_2O (Graph B) suggesting that this garment exerted no measurable compression; this maximum was obtained in the absence of external compression (Graph A).

The suspensory scrotal support was then tested on both subjects. As the balloon started to fill with saline, the simulated hematoma pushed the scrotal support forward result-

Figure 2A. Euron Net Knickers "Netelast knickers".

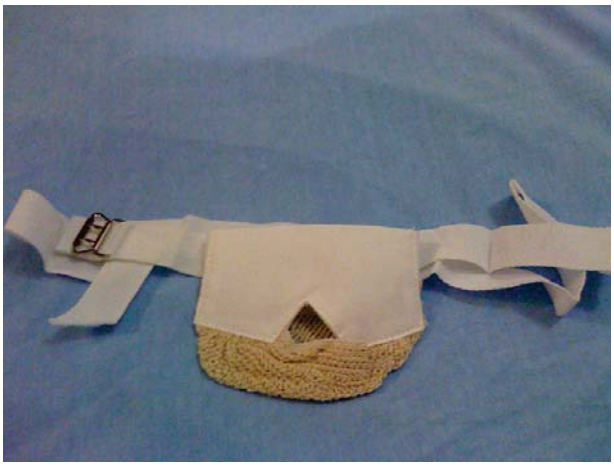


Figure 2B. Suspensory scrotal support.

Figure 2C. Tight swimming trunks Speedo® brief and shorts.

ing in falling of the balloon outside the scrotal support. The maximum filling pressure reached was 27 cmH_2O when the balloon was filled up to 196 mL of saline (Graph C). This result was similar in both subjects. We infer that some compression was exerted, but as the hematoma expanded, the garment could not contain it and its usefulness was compromised.

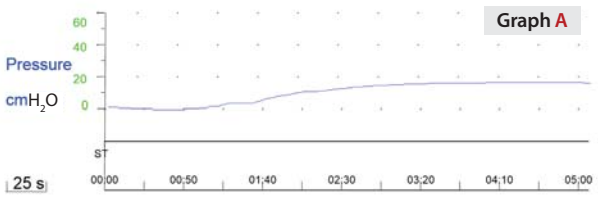
Figure 3. Testing the simulated expanding hematoma while wearing a Speedo® shorts in a male volunteer.

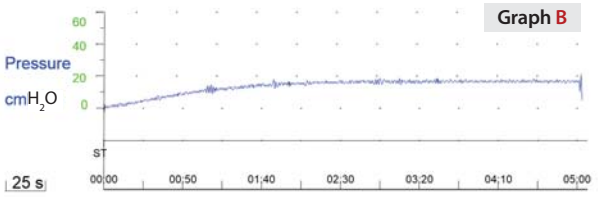
The two styles of Lycra swimming trunks, Speedo® briefs and shorts, were tested in subjects A and B. The result showed maximum filling pressures of 49 cmH_2O and 40 cmH_2O in subjects A and B, respectively, when the balloon was filled to 300 mL of saline (Graphs D and E). Subsequently, the Speedo® shorts were tested in both subjects. As filling process begins, there is a sudden increase in balloon pressure up to 40 cmH_2O after 50 seconds of filling. This is indicated by the high steep curve shown in Graph F. The pressure continued to raise steadily reaching maximum of 55 cmH_2O in subject A and 54 cmH_2O in subject B at the end of the balloon filling to 300 mL of saline.

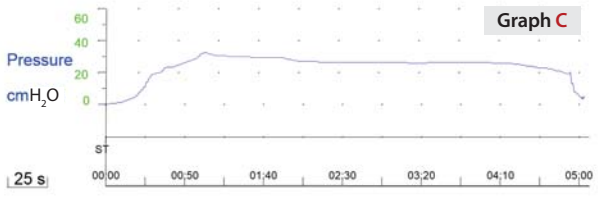
DISCUSSION

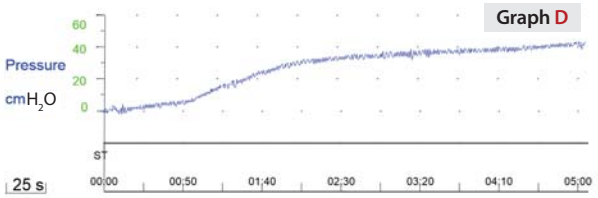
To our knowledge, this is the first study of a simulated expanding scrotal hematoma testing the efficacy of different methods of scrotal support used after scrotal surgery. Historically, post-surgery scrotal hematoma is the urologists' main concern as it is associated with significant morbidity.[1,3,6,8] The lax nature of the scrotum makes it prone to hematoma formation.[5,8,9] For this reason, it is a standard practice in scrotal surgery to ensure good hemostasis and to carefully suture the dartos muscle layer as it is a common source of bleeding.[5,8]

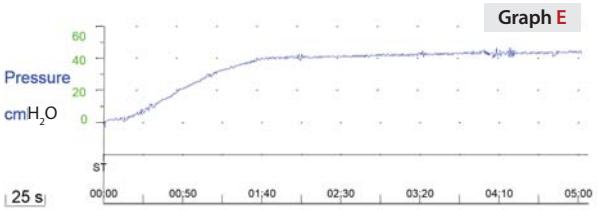
It seems likely that most scrotal hematomas occur as a re-

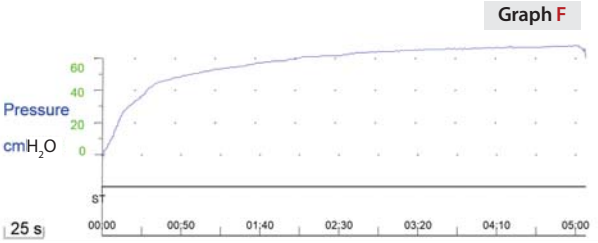












sult of capillary or venous bleeding as arterial bleeding will be easily seen and dealt with at the time of operation. A relatively modest increase in scrotal pressure achieved with external compression should therefore be effective in the prevention of this debilitating complication.

In our study design, we simulated an expanding hematoma using a novel model created by the authors. This study shows that the currently used methods of scrotal support in hospitals have limited value as the pressure exerted by these methods on the scrotum is not high enough to prevent hematoma formation. The results clearly show a lack of compression in respect to "Netelast pants" and scrotal supports.

However, the use of tight swimming trunks, Speedo® briefs and shorts, showed promising results. The pressures exerted by these garments were high as indicated in Graphs D, E, and F. The steep rise in pressure is reassuring in that external compression is exerted at an early stage of the hematoma formation, thereby hopefully preventing expansion. Furthermore, the magnitude of external pressure exerted by Speedo® swimwear was 55 cmH_2O (40 mmHg). This was thought to be high enough to prevent a hematoma formation yet unlikely to affect testicular perfusion and subsequent damage.

Other techniques to achieve the same end have been reported. Possibly the most practical are the so-called "Turban"[1] and the "Mummy wrap"[10] techniques. These can be difficult to apply, especially under local anesthesia. Furthermore, they require pendulous testicles and are not suitable to apply in men with smaller scrotums. Although we did not include these techniques in the present study, for reasons of comfort, we anticipate that it would provide good compression. The neck of the scrotum can be constricted excessively if the bandage is too tight. It is impossible for the patients to replace this bandage if it should become dislodge. For ease of use, therefore we favor the Lycra pants.

Our study has its limitations. Although our "filling balloon" design was created to simulate an expanding scrotal hematoma, we appreciate the scrotal wall structure and compliance is different. An animal model might be therefore more realistic. However, an ideal next step would be a clinical trial to test the efficacy of Lycra swimwear in the prevention of hematoma post scrotal surgery.

CONCLUSION

Whilst we recognize this study's limitations, we believe that the theoretical superiority of Lycra swimwear plus its ease of use and absence of discernible risk justify its routine use.

CONFLICT OF INTEREST

None declared.

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