Pediatrics

A Case of Compartment Syndrome in the Scrotum and Inguinal Area Complicating Idiopathic Nephrotic Syndrome of Childhood

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ABSTRACT

Idiopathic nephrotic syndrome (INS) is a kidney disease characterized by massive proteinuria. Protein loss leads to decreased oncotic pressure shifting the fluids into the interstitial space causing edema, complications such as infections and thromboembolism occur.

We report a 7-year-old, diagnosed with NS presenting with a relapse. He developed ascites and scrotal edema followed by severe scrotal pain and redness, progressing rapidly to ecchymosis in the inguinal areas not in continuity with the scrotum. Ultrasound with color Doppler was inconclusive, scrotal exploration was done along with skin incision in the inguinal areas and scrotum, which appeared to relieve the condition rapidly.

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Introduction

Idiopathic nephrotic syndrome (INS) is one of the most common chronic kidney diseases in children. It is characterized by proteinuria, hypoalbuminemia, edema, and hyperlipidemia. Protein loss results in a number of complications including edema, infections, thromboembolic disease, and acute kidney injury.

Scrotal involvement is a common finding in patients with NS1; it is usually confined to swelling which may be uncomfortable to the point of limiting activity. There have been some reports on complications that are more dramatic, including Fournier gangrene, and scrotal perforation following trauma in children with NS and severe scrotal edema.2,3

We report the first case up to our knowledge of compartment syndrome in the groin and scrotum in a child with NS.

Case report

A 7 year old boy; known to have INS was admitted to King Abdullah University Hospital. Increasing edema in addition to abdominal distention brought him to our emergency department. He was having a relapse. The mother started him on 60 mg/m² of prednisolone 10 days before admission.

Upon examination, the child had minimal periorbital swelling, pitting edema in his lower limbs with significant scrotal edema and tense ascites. He was afebrile, had stable vital signs; the rest of the exam was unremarkable.

His albumen upon admission was 12 g/dl. During his 5-day stay in hospital, before the incident he received in addition to diuretics, four doses of 20% albumen (1 gm/kg). Fluid intake was limited and he continued to receive IV methylprednisolone at a dose of 60 mg/m²; the edema and ascites improved significantly but the scrotal edema did not. The child was advised to continue bed rest; the foot of the bed was elevated, while applying support to the scrotum. On the fifth day of admission, he complained of progressive severe scrotal and lower abdominal pain.

Upon examination, the edematous scrotal skin was tender and warm to touch; it progressed from slightly erythematous to dusky red color within minutes, and worsened upon standing. No penile swelling was noted. Over the next 15 min pink-bluish discoloration started to appear over the inguinal areas, scrotal skin and upper inner thighs, however, it was not in continuity with the scrotal discoloration (Fig. 1).

His albumin level was low. No leukocytosis, or drop in his hemoglobin was noted. Urine analysis showed proteinuria and pyuria.

Urgent urology consultation was arranged. An Ultrasound of the scrotum with color Doppler examination revealed extensive...
subcutaneous fluid without the presence of gas. Both testes and epididymis were homogenous and had preserved vascularity.

After initiation of IV antibiotics, we opted for urgent scrotal exploration. Our differential diagnosis at that point was necrotizing fasciitis, cellulitis, vasculitis, epididymitis, spermatic cord and appendicular torsion.

A mid-raphe scrotal incision and two small bilateral inguinal incisions were made, large amount of clear fluid came out upon opening the scrotal wall, immediate improvement in the skin color in all affected areas as well as reduction in the swelling was noticed, all layers of the scrotal wall were healthy. Exploration of the testicles with complete release was done and both were intact. A specimen of subcutaneous tissue was taken for culture and histopathology, and the incision was laid open for healing.

The cultures from the tissue, blood and urine came back negative, antibiotics were discontinued 2 days later and the incision was closed (Fig. 2). Histopathology reported ischemia of the skin and subcutaneous tissue. The diagnosis was compartment syndrome secondary to ascites increasing abdominal pressure, compressing blood flow, and compromising blood supply to the scrotum and lower abdomen.

Discussion

A group of laboratory findings and clinical symptoms, caused by heavy proteinuria, defines NS. The aim of treatment is to slow or prevent further kidney damage, manage discomfiting symptoms such as edema, as well as preventing complications.

The scrotum is an elastic out-pouching sac in the inferior part of the anterior abdominal wall that narrows superiorly and consists of six different fascial layers. The outer three fascial layers of the scrotum include: the skin, a smooth muscle layer and a thin membranous layer that is a continuation of Scarpa’s fascia. The inner three layers of the scrotum are actually expansions of the covering fasciae of the spermatic cord.4

Recent data shows no fascial barrier between the scrotum and the peritoneum allowing fluid to flow between the two cavities, especially under the effect of gravity.5 Its tapered anatomical neck where it attaches to the central lower abdomen helps prevent fluid from entering the scrotum from the abdomen but makes it difficult to expel the fluid once edema spreads to it.

Scrotal edema is a common presentation of NS. In addition to the discomfort it bears, serious infections and tears in the scrotal wall in the presence of severe edema can complicate it.2,3 Fibrotic changes might also occur when edema is prolonged.

The blood supply to the scrotum is normally from three main sources. The first is the anterior scrotal artery. The second is the posterior scrotal artery and the third is the cremasteric artery. Scrotal veins usually follow the arteries4

We suspect that in this particular case either the artery or vein, which supply the skin that covers the inguinal area, had been compressed between two facial planes, ischemia proved by
histopathology ruled out venous congestion. Patients with tense ascites do not usually present with ischemia to the skin in the manner we are presenting, as the blood supply is not usually compressed between fascia planes. Variation in blood supply to the skin of the lower abdomen and scrotum could be the reason. Urologist should be alert to such variations. Acute scrotum is a surgical emergency, which requires prompt triage, and immediate intervention, the differential diagnosis includes torsion of spermatic cord or testicular appendages and acute epididymitis. Compartment syndrome due to tense ascites might also be a cause. Pediatricians dealing with cases of severe scrotal edema and tense ascites should also be alert to such a complication and prompt treatment to alleviate scrotal swelling in cases of NS need to be commenced.

**Conflict of interest**

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

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