

CASE REPORT

Necrotising fasciitis caused by invasive group A *Streptococcus* after trans-obturator tape placement

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Abstract. Transobturator tape placement has been advocated as a fast intervention for stress incontinence that has few complications. Infectious complications have generally been attributed to vaginal erosion, soft tissue infection and abscesses and have mostly remained localized. We describe a patient with necrotizing fasciitis caused by invasive group A *Streptococcus* following transobturator tape placement. The clinical diagnosis was acute necrotising fasciitis which was treated with polyclonal intravenous immunoglobulins in addition to antibiotics (penicillin and clindamycin) and conservative surgical treatment.

The use of polyclonal intravenous immunoglobulins is a novel medical treatment whose beneficial effects have been demonstrated in fulminate invasive group A *Streptococcus* infections, such as necrotising fasciitis and Streptococcal Toxic Shock Syndrome. Its mechanical actions include neutralization of exotoxins and superantigens, bacterial opsonization and anti-inflammatory effects. Necrotising fasciitis caused by invasive group A *Streptococcus* can occur as a severe complication of transobturator tape placement.

Introduction

Management of stress incontinence has been revolutionized by the introduction of tension-free vaginal tape and more recently, trans-obturator tape (TOT) placement [1]. Placement of a TOT has been advocated as a fast intervention for stress incontinence with few complications and a reduced risk of bladder perforation. Infectious complications have generally been attributed to vaginal erosion, soft tissue infection and abscesses and have mostly remained localized. We describe a patient with necrotising fasciitis caused by invasive group A *Streptococcus* (iGAS) after TOT placement, which was treated by surgery, antibiotics and polyclonal intravenous immunoglobulins (IVIg). In contrast to Fournier's gangrene with its mostly intestinal and mixed bacterial cultures [2], iGAS infections are often accompanied by Streptococcal Toxic Shock Syndrome (STSS) [3]. The clinical efficacy of IVIg has been reported in STSS [4,5], and it has been proposed that it may be potentially effective in treatment of severe soft tissue infections caused by iGAS [6].

Case report

A 43-year-old woman was admitted to our Intensive Care Unit (ICU) with septic shock caused by iGAS. About 3-4 hours passed before surgical intervention and admission to the ICU. The patient had a history of recurrent cystitis due to bladder outlet obstruction, which had been treated by Otis urethrotomy 10 years earlier. She had been pregnant twice and had vaginal deliveries 10 years and 18 years earlier. Symptoms of stress incontinence had been present for six

months and were treated by placement of a TOT (Figure 1). A Tyco obturator tape was used with the Obturator IVS tunneller™ IVSo4 according to manufacturers specifications [7]. Cystoscopy after TOT placement was not necessary. The procedure was initially successful and the patient was discharged from hospital the next day. Two days later she complained of pain in her back. Without a firm diagnosis being made, the patient was treated with NSAIDs. Four days after TOT placement she was admitted to hospital with increasing pain and swelling of both thighs. Only after severe back pain extending to both inner thighs, with painful skin swelling and erythematous discoloration of her groin was the diagnosis of necrotizing fasciitis considered. Several hours after admission the patient went into shock and respiratory failure requiring fluids, vasopressors and mechanical ventilation.

Blood tests showed no anaemia, a normal leucocyte count, a thrombopenia of $54 \times 10^9/L$ with an APTT of 41 sec., and a fibrinogen level of 8.9 g/L. Renal failure (blood urea nitrogen 19.1 mmol/L, creatinine level of 242 $\mu\text{mol/L}$, a high C-reactive protein level (CRP) of 527 mg/L and an elevated creatine phosphokinase (CK) level of 643 U/L was diagnosed. Liver enzyme levels were elevated with an alanine aminotransferase level of 60 U/L, an aspartate aminotransferase level of 123 U/L and a bilirubin level of 43 $\mu\text{mol/L}$. Abdominal CT-scan showed oedema in the gluteal and pelvic regions and the upper thighs, aggravated in a follow-up CT-scan by production of gas and ascites, but no abscess (Figure 2 b,c). Surgical intervention consisted of removal of the TOT and drainage of exudate by making three incisions (Figure 2a). Only limited necrotomy was performed as part of extended normal wound care.

On admission to hospital, blood and urine cultures showed Gram-positive cocci in duplo identified as group

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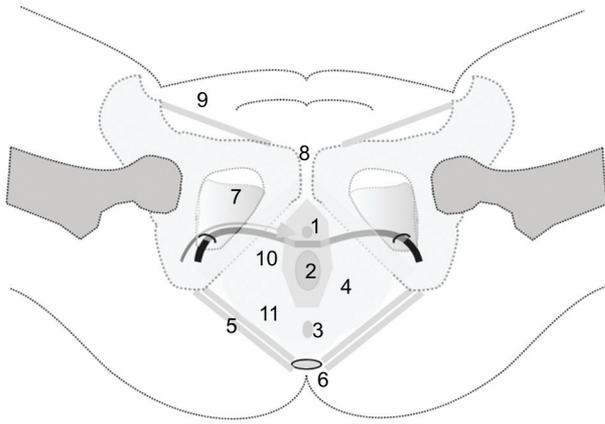


Figure 1. Drawing of the skeletal structures in relation to the soft tissues and skin surface. The location of the tape (thick black line) in relation to the skeletal structures and soft tissue is shown.

The tape is placed between the vaginal opening and the urethra. The arrow indicates the way the tape is inserted towards the anterior vaginal wall. It passes through the obturator foramen, perforating the obturator membrane.[7]. The obturator membrane is punctured during placement of the TOT, but the placement is completely extraperitoneal and does not extend beyond the pelvic floor muscles. The TOT resides between the urethra and the anterior vaginal wall, without tension on the urethra. It strengthens the anterior vaginal wall, so increasing the intra-abdominal pressure during stress also increases the pressure on the urethra more effectively and prevents stress-incontinence.

1= urethra, 2= vagina, 3= anus, 4 = pelvic floor, 5= sacro-tuberous ligament, 6= coccyx, 7= obturator foramen, 8= pubic symphysis, 9= inguinal ligament, 10= urogenital triangle, 11= anal triangle

A *streptococcus* (GAS). Histopathology of tissues acquired by thick needle biopsies showed extensive necrosis. Skin swabs and thick needle biopsy cultures from the inner thigh also revealed GAS thus confirming the clinical diagnosis. All strains were sensitive to penicillin and clindamycin. On the ICU antibiotic treatment was switched from intravenous amoxicillin/clavulanic acid 3 x 1200 mg and oral ciprofloxacin 2 x 500 mg to intravenous penicillin 12 x 10⁶ units and clindamycin 3 x 600 mg.

The patient was given a single additional dose of IVIg 4 hours after admission to ICU at a dosage of 2g/kg over 3 hours. Vacuum-assisted wound closure therapy was applied for 15 days to expedite wound closure. The patient stayed on the ICU for 7 days then subsequently another 31 days on the surgical ward before being discharged from hospital.

Discussion

The patient underwent TOT placement, causing problems that required admission to the ICU. Placement is normally carried out on the urology department as a short-stay procedure or even as an ambulatory procedure, to treat stress incontinence, and it has become more or less routine in the last few years. This treatment was originally described in France [1].

The purpose of the tape is to strengthen the anterior vaginal wall without placing tension on the urethra. As a result, an increase in intra-abdominal pressure will increase the pressure on the urethra and thereby prevent stress incontinence. The urethra is not continuously closed by the tape and no outlet obstruction is created (Figure 1). Necrotizing fasci-

tis is a rare complication of TOT-placement. In hindsight the severe and increasing pain should have alerted the physician. The diagnosis can only be made by surgical exploration and should not be postponed by additional examinations.

When faced with the clinical picture of septic shock combined with the physical presentation of STSS, GAS infection seemed obvious.

Initially, attention was drawn to a painful swollen skin discoloration, and, based on the presentation and the elevated CRP and CK levels as well as the recent TOT-placement, it was possible to differentiate between erysipelas, GAS and non-GAS infection at an early stage. Known risk factors for GAS infection include recent varicella infection, IV drug use, trauma, old age, young age, pneumonia, alcohol abuse, and diabetes [8]. In our patient CRP levels higher than 270 mg/L (± 102) were used as a sensitive screening test (sensitivity 0.89; specificity 0.90) indicating iGAS-necrotising fasciitis [9]. CK levels >600 U/L indicated invasive streptococcal infection (sensitivity 0.58; specificity 0.96) and GAS rather than non-GAS infection as well as increased mortality [10]. Thrombopenia and coagulation were consistent with STSS [3]. Typical radiological findings for iGAS infections included oedema and gas formation, which developed late in the pathological process [11]. Nevertheless, an inconclusive result should not delay treatment.

Surgical exploration is needed to establish the diagnosis and facilitate debridement. Initial treatment included adequate necrotomy and drainage of the incision wounds, antibiotic treatment and cardiopulmonary supportive care. Optimal antibiotic treatment consisted of combination therapy with penicillin and clindamycin and the determination and monitoring of antibiotic sensitivity [12]. Clindamycin was chosen due to its reported superior efficacy in severe iGAS infections [13]. No abscesses were seen and there was no further progression.

IVIg may be of additional value in severe iGAS infections. Its main proposed actions are opsonization of bacteria, neutralization of streptococcal exotoxins and super-antigens, and suppression of the hyperinflammatory responses.

Our case describes the application of IVIg, as part of a protocol for the diagnosis and treatment of necrotising fasciitis and STSS, which has been published elsewhere [14].

Our patient presented with STSS [3] and a high degree of suspicion of necrotising fasciitis. Bacteraemia, respiratory distress and shock were characteristic of GAS infection. Current methods of microbiological analysis and histopathology are highly specific (> 0.99) in the definitive diagnosis of iGAS [14,15]. Although surgical and medical treatment are the mainstay of treatment for group A streptococcal infections, more conservative surgical treatment [11] and expanded medical therapy have been reported to be equally effective, with less morbidity. IVIg has been documented to improve survival in STSS patients [4,5]. Less well documented is its efficacy in severe soft tissue infections, although beneficial effects have been reported in case reports [6] and in observational case series [4]. A potent anti-inflammatory effect through neutralisation of exotoxins and super-antigens and improved bacterial clearance by IVIg have been shown in patient materials [4,5,6]. Considering the limited efficacy of

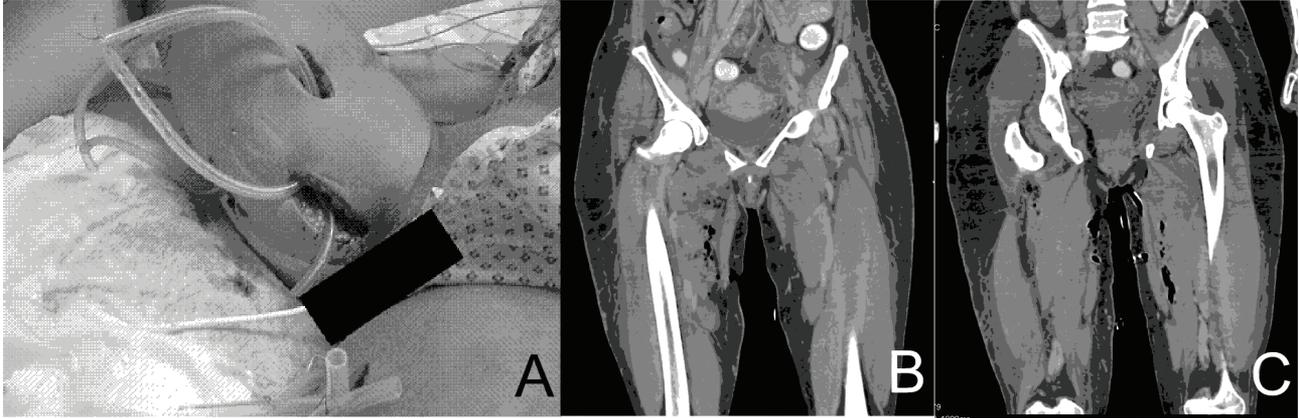


Figure 2a. Patient with three incisions in the upper thighs to ensure drainage of exsudate. Only limited necrotomy was performed as part of extended normal wound care. Large-scale resection of tissue was not performed. The location of the drains is visible.

Figure 2b. CT scan longitudinal and a follow-up CT scan 2 days later (2.c). Oedema and some gas is seen in the muscle tissue. The gas can be partly explained by the placement of the drains. The oedema is a symptom of the infection. No abscesses was seen.

contemporary treatment and the high mortality and morbidity associated with septic shock, STSS and necrotising fasciitis, advances in medical therapy are being sought. Increasing experience with IVIg therapy in GAS infections that results in reduced morbidity by limiting the extent of necrotomy as in this case, justifies further clinical research.

We describe necrotising fasciitis as a complication of TOT placement. We are reminded that iGAS infection can entail multi-organ failure as part of STSS, due to toxins rather than

sepsis, even with limited skin changes and the absence of fever. In this case, a patient with the clinical classification of acute necrotising fasciitis after TOT placement has been treated with IVIg in addition to surgery and antibiotics. Management of iGAS with conservative surgical treatment is facilitated by early diagnosis and medical treatment. Proper differentiation enables adequate medical treatment to be tailored to the patient's needs and a possibly improved surgical outcome.

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