



## The use of Tachosil<sup>®</sup> as hemostatic sealant in nephron sparing surgery for Wilms tumor: Preliminary observations

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### Abstract

**Background:** TachoSil<sup>®</sup>, which is an absorbable collagen sponge coated with human fibrinogen and thrombin, has proven to enhance hemostasis and promote optimal wound healing in adults undergoing nephron sparing surgery (NSS). We report our preliminary experience using this hemostatic agent during NSS in children.

**Methods:** Prospective analysis of 3 patients with Wilms tumor (synchronous bilateral in one) undergoing NSS at our institution over an 18-month period. Primary outcome measures were intraoperative bleeding control and surgery-related postoperative sequelae.

**Results:** Overall, 4 kidneys underwent 5 NSS procedures, which included 3 partial nephrectomies and multiple tumor excisions performed on another kidney at initial and second-look surgery. After control of major bleeding and suturing of the collecting system, which was entered during 2 of the 5 NSS procedures, TachoSil<sup>®</sup> was applied to the parenchymal surface of the kidney, achieving immediate hemostasis. All NSS procedures were performed without hilar clamping, drainage or stent placement. None of the patients required blood transfusion. Small perirenal fluid collections were documented postoperatively, and all spontaneously resolved within 4 weeks of surgery.

**Conclusion:** In children undergoing NSS, TachoSil<sup>®</sup> represents an effective and safe tool for control of mild to moderate bleeding, and also facilitates sealing and wound dressing.

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The rationale for nephron sparing surgery (NSS) is to limit potential long-term morbidity by maximizing the preservation

of functioning renal parenchyma. Several trends, including advances in imaging studies, improved surgical techniques and methods to prevent ischemic renal injury, have rendered NSS increasingly popular, and well integrated into in the management of renal tumors in both adults and children. In the

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latter population, current indications for NSS include patients with bilateral Wilms tumor, and patients with unilateral disease known to be at risk for end-stage renal disease or metachronous bilateral Wilms tumor. In contrast, the potential risk of renal dysfunction carried by nephrectomized children in the setting of a normally functioning contralateral kidney is considered clinically irrelevant to date [1].

Bleeding control and repair of the collecting system remain the 2 most significant challenges facing the surgeon during NSS. In the past decades, a wide variety of new surgical devices for dissection and hemostasis has been developed, along with a dizzying array of hemostatic agents and sealants to assist with hemostasis of the transected renal surface [2–4]. Current indications for the use and choice of such hemostatic agents are driven mostly by surgeon preference. We report our preliminary experience using TachoSil<sup>®</sup>, which is an absorbable collagen sponge coated with human fibrinogen and thrombin, as an adjunct to facilitate hemostasis during NSS in children with Wilms tumor.

## 1. Methods

We performed a prospective analysis of 3 patients with Wilms tumor who underwent NSS under a single surgeon over a 18-month period (June 2010 to January 2011). The lesions resulted monolateral in 2 patients with normal contralateral kidney, and synchronous bilateral in 1. Tachosil<sup>®</sup> was used with the intent to enhance hemostasis during NSS. Primary outcome measures were intraoperative bleeding control and surgery-related postoperative sequelae. Secondary measures included presentation, multimodal treatment and outcome. Approval by the Institutional Review Board at our institution was obtained, and parents signed an informed consent to the participation of their children in the study.

### 1.1. Surgical technique

We have already described in details our surgical conduct for NSS [5]. Briefly, all kidneys are approached transperitoneally, and partial nephrectomy is the procedure of choice. Tumor enucleation is reserved to large lesions centrally located or to allow maximum preservation of normal renal parenchyma when there are multiple and diffuse lesions. Hemostasis during NSS is controlled by compression on the renal parenchyma, exerted either manually or using a large vascular clamp. However, a vessel loop is encircled around the renal vascular pedicle to provide rapid access and clamping of the blood supply, if needed. The capsule of the kidney is scored with electrocautery to outline the planned extent of resection. If a tumor feeding vessel exists, its ligation allows for easier demarcation of such excision line on the normal-appearing parenchyma, of which 0.5 to 1 cm margin around the tumor should be included in the resected specimen. Frozen sections of the tumor base are

obtained to confirm a negative margin and to evaluate the histology. Pulsatile arterial bleeding from the parenchymal cut edge is controlled by suture ligation, and the collecting system, if entered, is also closed using a non-absorbable suture. TachoSil<sup>®</sup> is then applied directly to the bleeding area, either wet or dry, using the active side of the sponge, which is marked by a yellow color. The sponge is held against the renal parenchyma with a gentle pressure using a moist pad. Upon contact with blood or other fluids, TachoSil<sup>®</sup> mimics the last step of the clotting cascade producing a fibrin clot in 3 to 5 min. Surgical drain or urinary stent is not routinely inserted.

## 2. Results

Table 1 summarizes patient characteristics. Presentation included incidental renal mass during ultrasonography (patient 1), and palpable abdominal mass (patients 2 and 3).

Patients 1 and 2 had a well localized tumor confined to the lower pole of the right kidney, which measured 35 and 48 mm in maximum diameter, respectively. In patient 2, the medial border of the tumor was in close proximity of the hilar structures. Finally, patient 3 had synchronous bilateral tumors affecting with multiple diffuse lesions both kidneys.

Patient 1 received preoperative chemotherapy for localized disease according to the Société Internationale d’Oncologie Pédiatrique (SIOP) 2001 protocol, with negligible decrease in tumor size. He then underwent formal right partial nephrectomy including 1-cm margin of normal renal parenchyma. Following suture ligation of large intrarenal vessels, the TachoSil<sup>®</sup> sponge was applied to the bloody surface of the kidney remnant, extending 1–2 cm beyond the margins of the wound. Patient 2 was 6 months of age and, therefore, deemed a candidate for primary surgery. She underwent formal right partial nephrectomy, obtaining 0.5-cm of clear resection margin (Fig. 1). The lower calyceal system was entered and, after its suture repair, a TachoSil<sup>®</sup> sponge was applied as described in patient 1. Patient 3 was pretreated with chemotherapy for a total of 12 weeks of vincristine and dactinomycin (SIOP 2001 protocol), and 1 dose of doxorubicin. He then underwent bilateral NSS performed during a single operation, approaching first the left kidney, which had the larger tumor burden (Fig. 2). Multiple lesions with maximum diameter measuring 20 to 48 mm involved almost entirely the renal parenchyma, including the hilum. Multiple enucleations with an intent of having a clear margin of normal tissue were performed. A good amount of compressed renal parenchyma was eventually spared at the end of the procedure. TachoSil<sup>®</sup> was used to fold the posterior and equatorial portion of the kidney remnant in order to achieve additional hemostasis and to retain a more reniform contour. The hilar cut surface was dressed with an extra TachoSil<sup>®</sup> sponge to avoid parenchymal reapproximation under undue tension. The tumor burden in the right kidney involved the upper pole and the lateral rim of the equatorial region, allowing for a formal partial

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