CASE REPORT

Feasibility of microsurgical reconstruction of the male reproductive tract after percutaneous epididymal sperm aspiration (PESA)

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For obstructive azoospermia, surgical sperm retrieval from the epididymis for IVF/ICSI is an established management. However, various recent studies have established that surgical reconstruction with vasovasostomy or vasoepididymostomy remains a more cost-effective treatment option than upfront assisted reproduction. After epididymal sperm retrieval, fibrosis and scarring of the punctured epididymal tubule can lead to complete epididymal obstruction. The feasibility of

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Address correspondence to Peter Chan MD, S 6.95, Department of Urology, Royal Victoria Hospital,, McGill University Health Centre, 687 Pine West,, Montreal, Quebec H3A 1A1 Canada surgical reconstruction after surgical epididymal sperm retrieval has not been established. We describe two cases of bilateral microsurgical vasoepididymostomy, using a new 2-suture longitudinal intussusception technique we previously described, after previous successful bilateral percutaneous epididymal sperm aspiration (PESA). In both cases, motile sperm were found in ejaculate in the first post-operative semen analysis at 6 weeks and 2 months. We conclude that even in men with previous epididymal sperm retrieval, surgical reconstruction remains a feasible management option for fertility.

Key Words: obstructive azoospermia, PESA, sperm retrieval, vasoepididymostomy, epididymitis, IVF, ICSI

Introduction

With the improvement in the success rate and the increasing availability of assisted reproduction in the recent years, many couples in which the male partners

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have obstructive azoospermia opt for surgical sperm retrieval for *in vitro* fertilization (IVF) with intracytoplasmic sperm injection (ICSI). Assisted reproduction does not always result in pregnancy or live delivery. In fact, the success rates per cycle of IVF/ICSI vary significantly with the underlying etiology of infertility of the couple, the age of the female partner, and the experience of the reproductive center.

For men with obstructive azoospermia, surgical treatment with vasovasostomy and vasoepididymostomy has been established in various studies to be a more cost-effective option than upfront assisted reproduction.¹⁻³ With the recent advances in microsurgical reconstruction of the excurrent ductal system, the patency rate of vasovasostomy and vasoepididymostomy can approach 80%-100%.^{4,5} Not infrequently, couples who experienced failure of previous IVF/ICSI cycle using surgically retrieved sperm from the epididymis may enquire about the possibility of surgical reconstruction. Currently there is no established literature documenting the feasibility of surgical reconstruction post-epididymal sperm retrieval.

We hereby report the outcome of two successful cases of bilateral vasoepididymostomy after bilateral percutaneous sperm retrieval (PESA).

Case reports

Case one

The couple included a 37 year-old man and a healthy 32 year-old female partner, both presented with a 3year history of secondary infertility. They together had a 7-year old girl. Two years prior to their current presentation, the male partner was found to be azoospermic on three complete semen analyses performed over a period of 8 months with a normal hormonal profile (FSH 2.5 IU/L; testosterone 17.8 nmol/L). His past medical history was significant for a previous history of epididymo-orchitis at the age of 33, for which he was treated with a course of oral antibiotics. One year prior to their current presentation, the couple underwent a cycle of IVF/ ICSI using epididymal sperm. Bilateral PESA with a 23 G needle was performed. According to the operating report, three punctures were made to the left caput epididymis and only non-motile sperm were found. The right epididymis was punctured twice and motile sperm were found. The procedure was uncomplicated. Fertilization and embryo transfer was successful and a healthy full-term boy was delivered.

There was not adequate quantity of spermatozoa for cryopreservation.

The male partner presented to our clinic to enquire the possibility of surgical reconstruction. His current physical examination was unremarkable with bilateral testicular volume of 20 cc and fullness of the epididymides bilaterally.

The technique of the surgical reconstruction was as described previously.^{5,6} Intraoperatively, on both sides, there was significant scarring and adhesion between the tunica vaginalis and the epididymal tunica. Scarring was also seen in the caput, corpus and caudal epididymal tubules. Discoloration of the tubular fluid was remarkable, with the typical yellow, thick fluid within the majority of tubules in the caput Figure 1. Multiple sampling of the tubular fluid was made by puncture of the exposed epididymal tubules using a 10-0 micro-needle under an operating microscope. All fluid was examined at 100x microscopically by the surgeon. No sperm were found at the caudal or corporal epididymal tubules. Bilaterally, the caput epididymides were found to have motile spermatozoa. Upon cauterization of the punctured tubules with a micro-bipolar cautery, a fresh area on the caput epididymal tubule proximal to the punctured site where sperm was found was



Figure 1. The typical yellowish discoloration of the intra-tubular fluid of the epididymis (arrow) along with a significant tubular dilatation was noted.

selected for the vasoepididymostomy (using the 2 suture longitudinal intussusception technique using 10-0 nylon micro sutures) Figure 2.⁶

The operation was uneventful. Six-week postoperatively, the first semen analysis revealed 8 million/ml of spermatozoa with 3% motile and 25 % normal morphology.

Case two

The couple consisted of a 36 year-old man and a healthy 34 year-old female partner, both presented with a 4-year history of primary infertility. Three years prior to their current presentation, the male partner was found to be azoospermic on two complete semen analyses with a normal hormonal profile (FSH 4.0 IU/ L; testosterone 13.8 nmol/L). His past medical history was significant for a chlamydial infection at the age of 19, for which he was treated with a 2 week course of oral antibiotics. One year prior to their current presentation, the couple underwent a cycle of IVF/ ICSI using epididymal sperm. Bilateral PESA was performed with a 23 G needle. According to the operating report, three punctures were made to the left caput epididymis and motile sperm were found in one sample. The right epididymis was punctured twice and motile sperm were found. The procedure was uncomplicated. Among the seven ova retrieved, three were fertilized and developed into embryos for transfer. Despite the successful transfer of the three embryos, clinical pregnancy was not achieved. There was not adequate quantity of spermatozoa for cryopreservation.

The male partner presented to our clinic to enquire the possibility of surgical reconstruction. His current physical examination was unremarkable with bilateral testicular volume of 24 cc, presence of vasa bilaterally, and fullness of epididymides bilaterally.

The technique of the surgery was as described previously.^{5,6} Intraoperatively, there was minimal scarring and adhesion between the tunica vaginalis and the epididymal tunica. Although scarring was also seen in the caput and corpus epididymal tubule, it was significantly less severe than what was seen in case one. Discoloration of the tubular fluid was noted in the caput epididymis Figure 1. Multiple sampling of the tubular fluid was made by puncture of the exposed epididymal tubules using a 10-0 micro-needle under microscopic view. All fluid was examined at 100x microscopically by the surgeon. No sperm were found at the caudal or corporal epididymal tubules. Bilaterally, the caput epididymides were found to have motile spermatozoa. Upon cauterization of the punctured tubules with a micro-bipolar cautery, a fresh



Figure 2. Two-needle longitudinal intussusception vasoepididymostomy. The longitudinal placement of needles allows for a longer tubular incision, resulting in a larger opening

area on the caput epididymal tubule proximal to the punctured site where sperm was found was selected for the vasoepididymostomy using the 2 suture longitudinal intussusception technique Figure $2.^{6}$

The operation was uneventful. Six-week postoperatively, the first semen analysis revealed 100,000 /ml spermatozoa with 1% motile and 25 % normal morphology. At 3 months post-op, semen analysis revealed 3 million/ml of spermatozoa with 11% motility and 20% normal morphology.

Discussion

With the recent advances in the microsurgical technique in vasoepididymostomy,⁶ the post-operative patency rate has improved tremendously. Even in cases with previous failure of surgical reconstruction, a repeated attempt of vasovasostomy or vasoepididymostomy remains a more cost-effective option for fertility management.

Simultaneously, the popularity and availability of IVF/ICSI have been increasing tremendously in recent years. Surgical sperm retrieval for men with obstructive azoospermia has a high success rate, with virtually a 100% rate of finding sperm for IVF/ICSI.⁷

Given that the success rate of live-birth with IVF/ ICSI ranges 20%-40% per cycle, many couples, particularly those who experienced a failed IVF/ICSI cycle, may request alternative treatment. For men with obstructive azoospermia who had undergone previous surgical epididymal sperm retrieval, it is Feasibility of microsurgical reconstruction of the male reproductive tract after percutaneous epididymal sperm aspiration (PESA)

uncertain if surgical reconstruction is feasible. After the confluence of the efferent ductules at the proximal caput epididymis, the epididymal tubule remains a continuous tubule, with a gradual increase in its diameter towards the distal epididymis. Puncture of this delicate tubule would theoretically lead to firbosis, scarring and obstruction at the punctured site.

We describe two cases of successful vasoepididymostomy after previous bilateral PESA. Interestingly, despite a similar history of the previous PESA, the extent of scarring in the epididymal tubules varied significantly in the two cases. While the more extensive epididymal fibrosis is in the first case can be due his previous bilateral epididymitis,⁸ it is equally possible that there is a large variation in the extent of tubular fibrosis post-PESA, from minimal scarring (as in our second case) to more extensive fibrosis.

In view of the potentially large variation in the extent of tubular fibrosis post-PESA, scarring and obstruction of the punctured tubules may be minimal in some cases. Hence, sampling of epididymal tubule distal to the puncture site in cases where there is minimal fibrosis is advisable. This will allow anastomosis to the most distal tubule possible. This may, theoretically, improve the success rate since distal epididymal tubules generally have a larger diameter and a higher proportion of motile sperm.

Extending this idea further, perhaps in post-PESA cases in men who were previously vasectomized, sampling of the vasal fluid should be performed in cases where minimal scarring is seen. Finding of sperm in the vasal fluid permits a functioning vasovasostomy, which is technically easier to perform and conveys excellent post-operative success rates.

In conclusion, we hereby reported two cases of post-PESA vasoepididymostomy. Motile sperm were found in both cases post-reconstruction. As surgical reconstruction for obstructive azoospermia is a more cost-effective treatment option than upfront IVF, vasoepididymostomy may still be offered to patients even after previous PESA. Further investigations with a larger population are required to evaluate the long-term patency and pregnancy rates of these patients with reconstruction after previous PESA.

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