# Live-birth after injection of HOS-positive ejaculatory spermatozoa in an asthenozoospermic patient with total immotility

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## Abstract

A 25-year-old apparently normal female presented to the infertility clinic with a history of primary infertility of 8 years. Her husband was a 31-year-old smoker. His spermatozoa concentration was 22 million/ml with 0% motility and 99% abnormality. The vitality of his spermatozoa assessed by the hypo-osmotic sperm-tail swelling (HOS) test revealed 70% of spermatozoa with positive tail swelling. Seven (n=7) oocytes were retrieved (2 at germinal vesicle; 4 at metaphase II (MII) stages; 1 atretic). The 4 MII-oocytes were injected with spermatozoa that exhibited positive HOS-sperm tail swelling of which 1 fertilized. On day 4, a single very good quality compacting morula was transferred resulting in a singleton pregnancy that proceeded uneventfully to term with the delivery of a healthy baby boy at 40 weeks of gestation, weighing 2.6 kg. The present case report and previous similar reports have demonstrated it is possible to obtain pregnancies and live-births in patients with completely immotile ejaculatory spermatozoa. ICSI with apparently viable HOS-positive ejaculatory spermatozoa need be considered as the first option for patients with absolute asthenozoospermia (totally immotile ejaculatory spermatozoa). Testicular spermatozoa extraction need only considered in the absence of HOS-positive ejaculatory spermatozoa since the former was proven harmful with side effects.

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## Introduction

Asthenozoospermia is one of the causes of male infertility. It is characterized by reduced or absent motility of spermatozoa in the ejaculate. When 100% of the spermatozoa are immotile in the ejaculate it is referred to as absolute asthenozoospermia. It is a rare condition found in 1 in 5000 males (see review by Ortega et al., 2011). Intracytoplasmic sperm injection (ICSI) is widely used as the treatment of choice for severe male factor infertility. The introduction of ICSI made it possible to achieve pregnancy in cases of male factor infertility including asthenozoospermia. Selecting viable spermatozoa is critical to the success of fertilization in ICSI. Since motility is the primary sign of spermatozoa viability, it is difficult to differentiate viable from non-viable spermatozoa in cases of absolute asthenozoospermia. Hence, fertilization and the pregnancy rate in ICSI using randomly selected completely immotile spermatozoa is very low (Nijs et al., 1996; Ortega et al., 2011).

Some workers reported poor outcome with immotile ejaculatory sperm but obtained fertilizations, pregnancies and live-births when testicular spermatozoa were used which prompted them to recommend the use of testicular sperm (Nijs et al., 1996; Kahraman et al, 1996,1997; Kaushal et al., 2007). However, other workers have obtained pregnancies and live-births using ejaculatory spermatozoa (Barros et al., 1997; Ved et al., 1997; Ali et al., 1998; 2002; Peeraer et al., 2004; Hattori et al., 2011; Geber et al., 2012). The use of ejaculatory

spermatozoa is not invasive compared to the use of testicular spermatozoa.

The present report is a case of a successful pregnancy and live-birth in a patient with totally immotile spermatozoa achieved by ICSI with the selective use of the hypo-osmotic sperm-tail swelling (HOS) test (Jeyendran et al., 1984) for the selection of potentially viable (HOS-positive) spermatozoa.

## Case Report

A 25-year-old female presented to the infertility clinic with a history of primary infertility of 8 years duration. Her past medical and surgical history was unremarkable. All her infertility work-up, including cycle day 2 hormones, ultrasound, and hysterosalpingogram, was within normal limits. Her husband was a 31-year-old smoker. He is not known to have any previous medical conditions or surgery. His basal semen analysis showed a sperm concentration of 22 million/ml with 0% motility and 99% abnormal morphology. The vitality of spermatozoa was assessed by using the HOS test. About 70% of sperms exhibited tail swelling in hypo-osmotic (HOS) medium which appeared compatible with viability.

The patient underwent an IVF stimulation cycle using the GnRh antagonist protocol. Seven (n=7) oocytes were retrieved of which 2 were at germinal vesicle stage, 1 was atretic and 4 were at metaphase II (MII) stage. None of the spermatozoa were motile. The 4 MII-oocytes were injected with spermatozoa that exhibited positive HOS-sperm tail swelling. Only 1 of the 4 injected oocytes fertilized. On day 4, a single very good quality compacting morula was transferred using a Labotect embryo transfer catheter. A singleton pregnancy was achieved. The patient had an uneventful pregnancy and delivered a healthy baby boy at 40 weeks–gestation, weighing 2.6 kg. .

## Discussion

The introduction of ICSI provided an effective treatment modality for male factor infertility. Spermatozoa vitality conferred by its motility is a prerequisite for the success of ICSI. In addition to motility, several techniques have been described to detect the viability of spermatozoa, one of which is the HOS test (Jeyendran et al., 1984). When immotile ejaculatory spermatozoa are used for ICSI, the fertilization rates are usually low (Ortega et al., 2011). Some workers have advocated the use of the HOS test prior to ICSI to select viable spermatozoa for injection (Ved et al. 1997; Ali et al., 1998, 2002; Peeraer et al., 2004; Geber et al., 2012) in order to increase the fertilization rate in cases of asthenozoospermia accompanied by the complete absence of motility. In our report, HOS test was used to select the potentially viable spermatozoa for ICSI with some success and a live-birth. Although some workers (Kahraman 1996, 1997; Kaushal et al., 2007) recommend the use of testicular spermatozoa, it is an invasive procedure with permanent harmful damage to the testes often accompanied by adhesions resulting in long-term scrotal pain. Besides, it is also possible that testicular biopsies may not guarantee recovery of any spermatozoa especially in patients exhibiting severe oligozoospermia (Kahraman et al., 1997; Ali et al., 1998; 2002). In the light of available evidence, it appears pertinent to proceed with the use of ejaculatory spermatozoa alongside the use of the HOS-test to identify potentially viable sperm in the presence of spermatozoa in the ejaculate.

Nijs and coworkers (Nijs et al.,1996) have demonstrated the potential of initially immotile and completely immotile spermatozoa to fertilize an oocyte after ICSI irrespective of their origin whether from ejaculate, epididymis, or the testes. However, completely immotile ejaculatory spermatozoa had lower fertilization rates. Ongoing pregnancies were achieved by ICSI with immotile spermatozoa of all three origins. Although Kahraman and coworkers (Kahraman et al., 1997) obtained fertilization with completely immotile ejaculated and testicular spermatozoa, viable pregnancies were only achieved with completely immotile spermatozoa of testicular origin. Four ongoing pregnancies and two healthy births were reported in the testicular spermatozoa group. Two pregnancies were obtained after ICSI with completely immotile ejaculatory spermatozoa but both resulted in abortion (Kahraman et al., 1996). These results prompted Kahraman and coworkers (Kahraman et al., 1997) to conclude that the use of testicular spermatozoa is the appropriate means of treating patients with

absolute asthenozoospermia instead of using ejaculatory spermatozoa.

However, Ali and co-workers (Ali et al., 2002) reported for the first time three live-births (all females) in the same patient after successful ICSI with totally immotile ejaculatory stump-tail spermatozoa beginning from 1996 through 2001 involving four treatment cycles in which treatment cycles 1, 3 and 4 resulted in live-births. These workers (Ali et al., 1998; 2002) used the HOS-test developed by Jeyendran and co-workers (Jeyendran et al. 1984) with a modification to identify viable ejaculatory spermatozoa from semen samples that exhibited completely immotile stump-tail spermatozoa.

Moreover, several studies around the same period reported successful pregnancies and live-births using immotile ejaculatory spermatozoa. Barros and coworkers obtained fertilizations, pregnancies and live-births in a series of four patients with totally immotile spermatozoa but with normal vitality scores. Out of 36 randomly injected oocytes, 19 fertilized and cleaved. One patient achieved a successful pregnancy with term delivery of two healthy twins (Barros et al., 1997). Ved and co-workers reported a singleton pregnancy by ICSI after selection of viable spermatozoa using the HOS test in a couple with totally immotile spermatozoa (Ved et al., 1997). In addition, many workers reported successful pregnancies and healthy live-births after ICSI with completely immotile ejaculatory spermatozoa in patients with Kartagener's syndrome and immotile cilia syndrome (Peeraer et al., 2004; Hattori et al., 2011; Geber et al., 2012).

In conclusion, the present case report and previous similar reports have demonstrated that it is possible to obtain pregnancies and live-births in patients with completely immotile ejaculatory spermatozoa. Therefore, ICSI with ejaculatory spermatozoa, especially with the use of HOS-test to select potentially viable spermatozoa, should be considered as the first option for patients with absolute asthenozoospermia (totally immotile ejaculatory spermatozoa) before considering the use of testicular spermatozoa that requires an invasive procedure which has also proven to be harmful with side effects. It is suggested that testicular spermatozoa should be used only as a last resort in the absence of viable ejaculatory sperm.

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