

Tubules in Semen of Infertile Patients

Case Report

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Numerous groups of small tubules were observed in the semen of two infertile patients. These structures were about 80 nm in diameter and could be observed within larger concentric tubules. They did not resemble typical microtubules, and did not appear similar to unit membrane.

Key words: semen, infertility, tubules.

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Male infertility is caused by many different factors. Unfortunately, it has not been possible to diagnose the cause of infertility in a large percentage of infertile men. To treat undiagnosed infertility, it is essential to identify the different classes of infertile patients. We present a morphologically distinct syndrome noted in two infertile men. Semen of these patients contained numerous aggregates of tubular structures. It is our hope that others will have observed the same or similar syndrome, and that their information will help in the diagnosis and treatment of this syndrome.

Materials and Method

Electron Microscopy

Semen, collected by masturbation, was allowed to liquefy at room temperature for 30 to 45 minutes. Semen was then centrifuged at $1500 \times g$ for 10 minutes. The pellet was fixed in 2.5% glutaraldehyde buffered in 0.2 M collidine and stored at 0 to 5 C overnight. Pellets were cut into several pieces, rinsed in collidine buffer and postfixed in 1% collidine buffered OsO_4 . Pellets were dehydrated in alcohol to propylene oxide. Polybed-embedded material, sectioned with a Reichert Om-U3 ultratome, was stained

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with 3% aqueous uranyl acetate and examined with a Philips 300 microscope.

Results

Patient Histories and Semen Analysis

Patient 1 was a 30-year-old, moderately obese white male who has been a two-pack per day smoker for 12 years. He worked as a short-order cook and took very hot, prolonged baths. His prior medical history was positive for bilateral inguinal hernia repair as a child. His physical exam revealed a 15-cc firm right testis, a 25-cc firm left testis, and normal male body habitus. Endocrine function measured by serum FSH, LH, T, and prolactin were within normal limits. His semen analysis showed on one occasion a count of 13×10^6 spermatozoa/ejaculate, with 8% motility and on another 7.74×10^6 spermatozoa/ejaculate, with 10% motility, falling to 0% after one hour.

Patient 2 was a 34-year-old, moderately obese white male whose prior history was positive for an episode of orchitis 10 years prior to evaluation, and prostatitis 4 years previous to that. His physical exam revealed a very small scrotum with a 15-cc firm right testis and a firm 25-cc left testis. His endocrine function, measured by serum FSH, LH, T, and prolactin, was within normal limits. He had a normal male body habitus. Semen analysis revealed a count of 212×10^6 spermatozoa/ejaculate, with less than 5% motility. Subsequent analysis showed 164.9×10^6 spermatozoa, with 0% motility, 57.6×10^6 , with less than 5% motility and 405×10^6 , with less than 10% motility. Of special note was his small, high riding scrotum that caused his testicles to be nestled close to the internal ring. Because of the anatomic abnormality, his testes were most likely exposed to continuous excessive heat.

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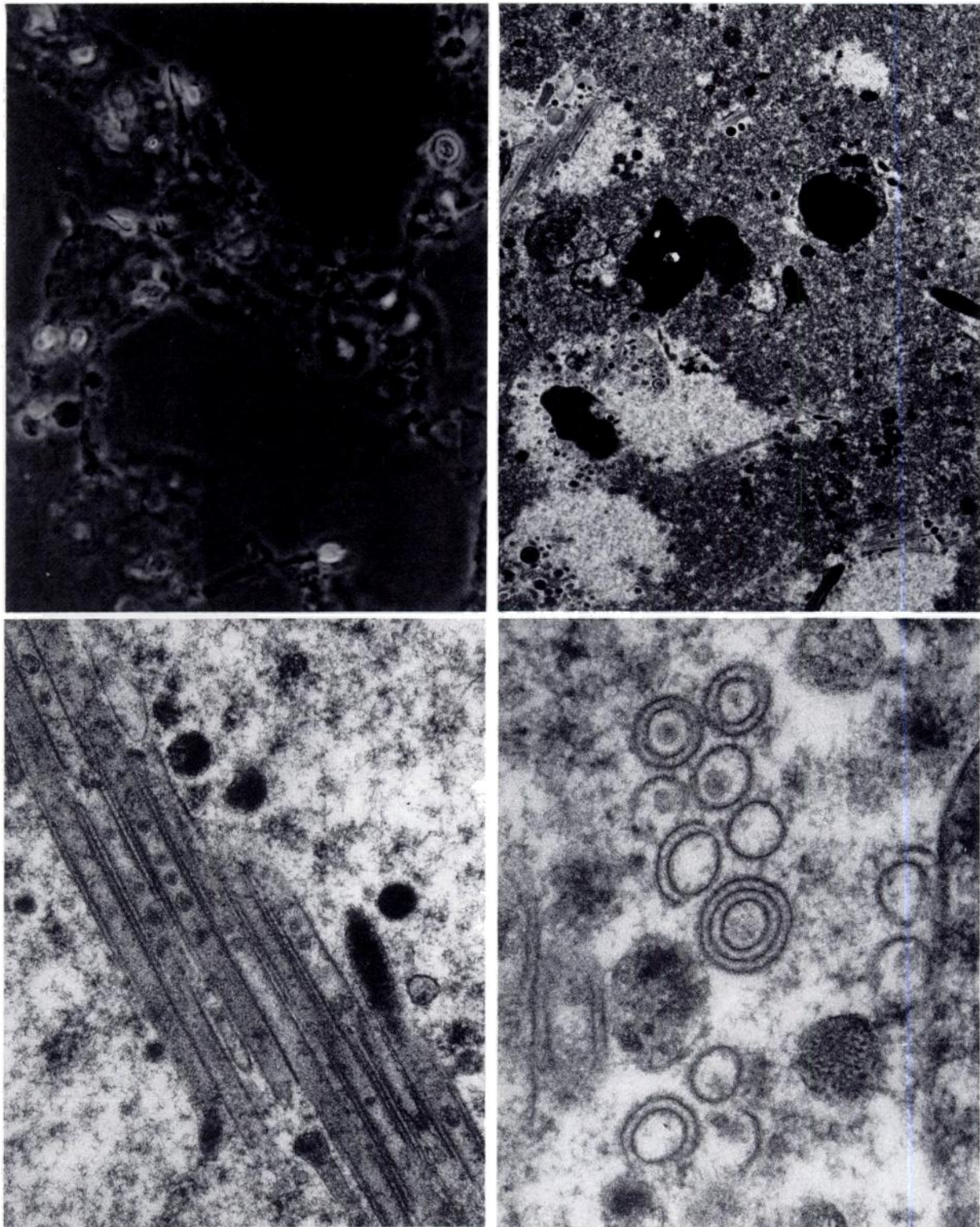


Fig. 1 (upper left). Phase contrast photomicrograph of semen from Patient 2. We observed clumped spermatozoa and amorphous material in both patients ($\times 400$). **Fig. 2** (upper right). Agglutinated mass of material from Patient 2 is composed of amorphous material, degenerated spermatozoa, and tubules ($\times 3000$). **Fig. 3** (lower left). Longitudinal section of tubules from Patient 2 ($\times 60,000$). **Fig. 4** (lower right). Transverse section of tubules from Patient 2 ($\times 105,000$).

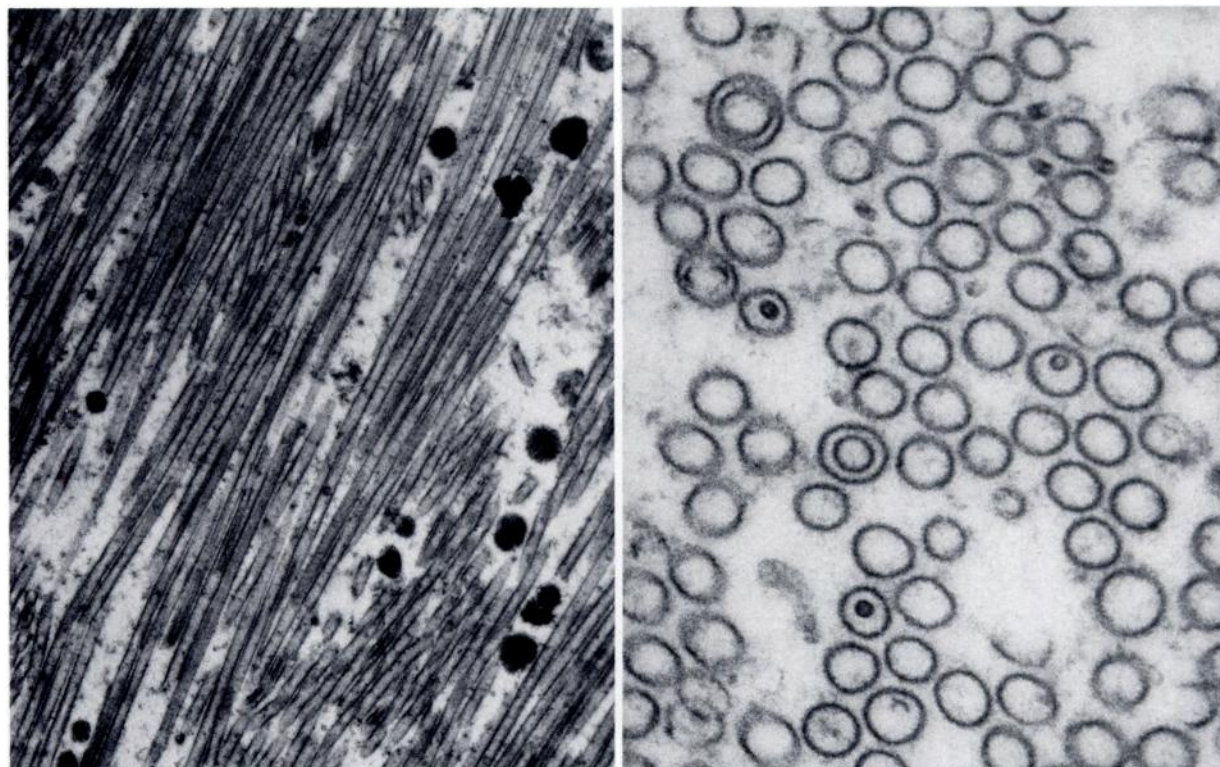


Fig. 5 (left). Longitudinal section of a group of tubules from Patient 1 ($\times 14,000$). Fig. 6 (right). Transverse section of a group of tubules from Patient 1 ($\times 74,000$).

Phase Microscopy

In the semen of both patients we observed spermatozoa embedded in amorphous material (Fig. 1). We sometimes observed filamentous structures, which were particularly apparent in the semen of Patient 1.

Electron Microscopy

In addition to spermatozoa and amorphous material (Fig. 2), the semen of both patients contained tubular structures that were so prevalent that they were observed in almost every medium magnification field. In Patient 2, the tubules generally occurred in groups. Tubules were about 80 nm in diameter. Vesicles were sometimes observed within the tubules (Fig. 3). In transverse section, tubules were seen to be about 80 nm in diameter. The material did not have the trilaminar appearance of a unit membrane and did not resemble the structure of a microtubule. In some cases, the tubules were composed of two or more concentric circles (Fig. 4). Patient 1 showed similar morphology except that in some cases we observed larger clusters of the tubules. In both patients the small tubules were aligned parallel to each other (Fig. 5). In transverse section, concentric

circles and small internal vesicles sometimes were observed (Fig. 6).

Discussion

We have observed small tubular structures in the semen of two infertile patients. These structures were very prevalent in sections of pelleted spermatozoa from both men. In recent years we have examined spermatozoa from about 50 infertile and fertile patients and have not seen similar structures in pelleted semen from any of them. To our knowledge, they have not been described in the literature although there have been numerous EM studies involving pelleted spermatozoa from semen of fertile and infertile men. Thus, it is likely that these structures are unique or certainly much more prevalent in a small group of infertile men. In only two patients it is difficult to speculate about what might have caused such tubular structures. However, both patients appear to have had their testes exposed to excessive heat for prolonged periods of time. Therefore, it may be of interest to see if semen from other men whose testes have been exposed to excessive heat contain similar structures.