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Bacterial infection and semen quality

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Abstract

We have analyzed two infertile male cohorts with ($n = 39$) and without genital tract infection ($n = 14$) comparing their selected seminological parameters with healthy controls ($n = 30$). Genital tract infection (GTI) has been defined by the presence of leukocytes and pathological bacterial strains identified with Bio-Merieux tests. We have found statistically significant deteriorated semen volume, sperm concentration, motility, morphology and vitality in ejaculated samples of patients with genital tract infection in comparison to healthy controls. Statistically significant negative influence towards sperm reproductive potential has been revealed in case of *Escherichia coli*, *Ureaplasma urealyticum* and *Staphylococcus aureus*.

Keywords: Male infertility; Genital tract infection; Semen quality

1. Introduction

Genital tract infection (GTI) is the most important cause of male infertility, affecting not only sperm cell function, but the whole spermatogenesis (Henkel and Schill, 1998; Sanocka et al., 2004; Urata et al., 2001). Deterioration in spermatogenesis, obstruction of the seminal tract and defect of spermatozoa function may be caused by activation of seminal plasma white blood cells or cellular reactions against microbial agents, as well as by direct influence of pathological bacterial strains on gametogenic cells (Keck et al., 1998). Many studies have examined the impact of genital tract infections on male fertility; however the effect of bacteriospermia on sperm quality is still controversial (Haidl, 1990).

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Microorganisms might affect the male reproductive function causing the agglutination of motile sperm (Monga and Roberts, 1994), reducing ability for the acrosome reaction (Kohn et al., 1998) and also causing the alterations in cell morphology. The aim of our study was to analyse the influence of particular bacteria strains on the semen quality.

2. Materials and methods

2.1. Patients

Altogether, 83 ejaculated semen samples from control individuals and the two infertile male cohorts (with and without genital tract infection) were examined. Semen samples were obtained from patients ($n = 53$) and healthy controls ($n = 30$) by masturbation after 4 days of sexual abstinence. Normozoospermic healthy individuals with density >20 million spermatozoa/mL of ejaculate, progressive motility >50%, normal morphology >30%, of age between 22 and 30 years constituted the control group (World Health Organisation, 1992). Infertile patients with a genital tract infection ($n = 39$) and infertile patients without infection ($n = 14$) were recruited from the Infertility Clinic, Intermedica, Poznan. All the infertile patients had pathological spermiograms; density <20 million spermatozoa/mL of ejaculate, progressive motility <50%, normal morphology <30%. Patients were considered infertile with no ability to conceive within a couple for at least 2 years.

The female partners were carefully examined for anatomical, hormonal or immunological parameters, however normal ovulatory profiles, patent Fallopian tubes and no signs of immunological reactions to gametes were detected. On the basis of at least 2 years lasting infertility the couples have been assigned as infertile. All infertile couples were selected to IVF/ICSI procedure in future due to the “male factor”.

Leukocytes were indentified by May–Grunwald–Giemsa staining although the concentration of these cells in healthy males never exceeded $>0.5 \times 10^6$ cells/mL of semen and the bacteriological analysis did not show any pathological flora presence. Bacteriological semen analysis was performed on a solid-phase using a quantitative method of assessment. Plates were seeded in aerobic and anaerobic conditions. After incubation at 37 °C, the number of microorganisms in 1 mL of semen was estimated using Bio-Merieux tests as following:

- *Staphylococci*: ID32 Staph test;
- *Streptococci*: AP120 Strep test;
- *Bacteriaceae Gram-negative*: K32E test;
- *Corynebacteriaceae*: API Coryne test;
- *Anaerobic Bacteriaceae*: ID 32C test;
- *Mycoplasmaceae:* Mycoplasmic IST test-allowing to define the species and their concentration, as well as sensitivity to antibiotics.

2.2. Sperm preparation

After 30 min of semen liquefaction at room temperature, semen samples were subjected to the routine andrological analysis (semen volume, sperm density, progressive motility, morphology and viability) including leukocytes and bacteriological evaluation.