Total motile sperm count: a better way to rate the severity of male factor infertility?

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Subfertility affects up to 18% of couples, and poor semen quality has been implicated in approximately half of the cases. Semen analysis has been universally used to assess semen quality. In 2010, the World Health Organization (WHO) defined new reference values for sperm parameters to discriminate between normal and abnormal semen samples (including oligozoospermia, asthenozoospermia, teratozoospermia, and the combinations of these factors) (Cooper et al., 2010). However, reports suggest that the prognostic relevance of the 2010 WHO classification system is poor (Esteves et al., 2012; Hamilton et al., 2015).

Semen parameters such as volume, concentration, and motility can be pooled to yield a different manner to express sperm quality: the total motile sperm count (TMSC). The TMSC is obtained by multiplying the volume of the ejaculate by the sperm concentration by the proportion of progressive motile sperm divided by 100% (Ayala et al., 1996), and can be calculated from the neat semen (preshaw TMSC) or after semen preparation (postwash TMSC).

Several reports have shown that the TMSC has a prognostic value in couples undergoing intrauterine insemination (van Weert et al., 2004; Badawy et al., 2009; Nikbakht & Saharkhiz, 2011) in predicting total fertilization failure after conventional in vitro fertilization (IVF) (Rhemrev et al., 2001). Recently, the TMSC was shown to have a stronger correlation with the spontaneous ongoing pregnancy rate than the WHO 2010 classification system (Hamilton et al., 2015). Couples with a TMSC < 5 x 106 had a significantly lower chance of spontaneous ongoing pregnancy than couples with a TMSC > 5 x 106.

Hamilton et al. (2015) proposed three prognostic groups of semen quality according to the TMSC: (i) < 5, (ii) between 5 and 20, and (iii) > 20 x 106 spermatozoa (the latter being considered a normal TMSC value). Additionally, it was suggested that the TMSC should be the method of choice to rate male infertility. However, little is known about the prognostic value of the TMSC classification for ICSI outcomes.

In a study performed at our center with couples undergoing ICSI due to male factor infertility, the TMSC was the only seminal parameter to affect the formation of high-quality embryos on D2 (OR: 1.18, CI: 1.03–1.35, P=0.013) and D3 (OR: 1.12, CI: 1.07–1.29, P=0.037), the formation of blastocysts (OR: 1.16, CI: 1.04–1.26, P=0.011), and the blastocyst expansion grade (OR: 1.27, CI: 1.01–1.60, P=0.042). The TMSC was also a better predictor for miscarriage (OR: 0.52, CI: 0.28–0.90, P<0.045) than the WHO cutoffs. Additionally, significantly higher fertilization rates (84.9 ± 14.4 vs. 81.1 ± 15.8, P=0.016) and lower miscarriage rates (17.9% vs. 29.5%, P=0.041) were seen in couples with normal versus abnormal TMSC (unpublished results).

The reference values established by the WHO in 2010 were determined based on men who had recently fathered a child. Therefore, it is not wise to define fertility or infertility based on semen parameters below or within/above the WHO cutoffs. Moreover, the WHO classification system seems to be much more stringent than the TMSC when it comes to defining male infertility, since more couples have been diagnosed with male infertility when the WHO criteria were applied than when the TMSC was used. A pertinent explanation for this discrepancy is that the TMSC considers absolute sperm parameter values simultaneously, while the WHO criteria treats sperm parameters discretely.

ICSI is the treatment of choice for couples with male factor infertility, since it bypasses sperm limitations related to the fertilization process. Therefore, it has been suggested that seminal parameters do not impact the outcomes of ICSI. However, one might argue that male factor infertility, when rated by the TMSC, affects the outcome of ICSI, a situation that is not observed when the normality of seminal parameters is assessed by the WHO classification system.

Our results have shown that the TMSC is a better predictor for ICSI outcomes than the criteria recommended by the WHO. This new information supports the organization of further prospective randomized studies to verify the superiority of the TMSC in relation to the WHO classification system in rating male infertility severity.

REFERENCES


