Sperm Morphology And Seminal Leukocytes As Predictors Of Increased Production Of Reactive Oxygen Species (ROS) In Infertile Men Semen

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Objective: Poor sperm morphology and excess seminal leukocytes have been correlated with increased seminal ROS. This study evaluates the power of these two variables in predicting excess ROS in semen of infertile men.

Design: Prospective study.

Materials/Methods: Semen specimens were obtained from 39 infertile men. Sperm count and motility were assessed applying the WHO standards. Pap-stained semen smears were prepared for assessment of sperm morphology applying the strict criteria and using the multiple entry scoring technique. Seminal leukocyte concentrations were determined using a myeloperoxidase-staining method. Levels of seminal ROS were determined by a chemiluminescence assay and results expressed as $10^6$ counted photons per minute (cpm)/$20\times10^6$ sperm/mL. Mann-Whitney U test was utilized to compare semen attributes in the patient groups.

Results: Eight patients had low ROS ($\leq 1\times10^6$ cpm) and 31 patients had high ROS ($>1\times10^6$ cpm) in semen and the difference between the two groups was statistically significant (medians: 0.14 and 14.27, respectively, P < 0.0001). The proportion of sperm with borderline morphology (sperm with rounded head, slight post acrosomal narrowing or a slight loss of the oval shape of sperm head) was significantly higher in patients with low seminal ROS compared to those with high ROS (Medians: 17.5 and 6, respectively, P = 0.016). Patients with low ROS, also, had significantly smaller proportions of sperm with amorphous heads and midpiece defects compared to patients with high seminal ROS (amorphous head medians: 40 and 47 respectively, P = 0.046; and midpiece medians 15 and 26 respectively, P = 0.0068). Seminal leukocyte concentrations were significantly higher in patients with high seminal ROS compared to the other group (medians: 0.4 and 0.0 respectively, P = 0.0012). Sperm count and motility were not significantly different in the two groups. All sperm variables and seminal leukocyte concentrations were subjected to forward stepwise logistic regression analysis to identify a suitable model predicting high seminal ROS. Borderline morphology was the only variable selected as shown in the table. The one-variable model successfully predicted 100% of patients with high seminal ROS (31/31) and 50% of patients with low seminal ROS (4/8). The model had an overall accuracy of 90%.

Conclusions: The proportion of sperm with borderline morphology is a powerful predictor of high seminal ROS in infertile men. Male infertility clinics with no facilities to assess seminal ROS may rely on sperm morphology in identifying patients with high seminal ROS.

<table>
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<tr>
<th>Model</th>
<th>Intercept</th>
<th>Borderline Morphology</th>
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<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>SE (beta)</td>
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<td></td>
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