Objectives: Reactive oxygen species (ROS) are implicated in the impairment of sperm quality in infertile men. High levels of ROS are produced by polymorphonuclear granulocytes (PMN) in the semen. The etiology of infertility in endometriotic patients is unclear. High macrophage concentration has been reported in the PF of endometriotic women. This study was designed to determine: the source and level of ROS in PF of women with and without endometriosis; the cellular distribution of white blood cells (WBC) in the PF, and the effect of PF incubation on sperm motion and functional characteristics.

Design: A prospective clinical study.

Materials and methods: PF was aspirated in endometriotic (stages 1 to 4, n = 17), and nonendometriotic (stage 0, n = 15) patients by laparoscopy. Absence of PMN was confirmed by myeloperoxidase stain and smears were stained for differential WBC counts. ROS was measured in raw and supernatant PF by a chemiluminescence assay. Normal donor semen was washed by swim-up method and incubated for 3, 5, and 24 h with PF (supernatant) to assess sperm motility and motion characteristics (curvilinear velocity, straight line velocity, average path velocity, linearity, and amplitude of lateral head displacement) by a computer-assisted semen analyzer. Acrosome reaction was evaluated by Acroneed test using a monoclonal antibody kit. Percentage binding of beads to acrosomally reacted spermatozoa was scored in the presence of PF (supernatant) at 3, 5, and 24 h of incubation.

Results: All PF samples were negative for granulocytes. ROS levels were similar in the PF (supernatant) of both endometriotic and nonendometriotic patients (28.7 ± 31.5 X 10^4 vs 23.8 ± 30.3 X 10^4 cpm, respectively) as well as in PF of raw samples (endometriotic: 267.8 ± 254.8 X 10^4 cpm; nonendometriotic: 310.2 ± 206.8 X 10^4 cpm). ROS levels were significantly higher in the raw PF compared to supernatant PF (P<0.005). Sperm motility and linearity showed no significant difference after incubation of sperm with PF from endometriotic patients. Significant inhibition was however, seen in all other motion characteristics (P<0.05). In nonendometriotic patients these motion characteristics improved after 24 h (P<0.05). Acrosome reaction showed no significant difference between the two groups.

Conclusions: High ROS levels observed in raw PF indicate a cellular origin of ROS. The absence of peroxidase positive PMN in PF suggests that these cells may not be a major source of ROS. This is contrary to reports of high PMN concentration and high levels of ROS seen in the semen of some infertile men. Breakdown products of macrophages (cytokines or interleukins) in PF may be responsible for high ROS production. Unlike semen specimens, extremely high ROS levels (20 to 30 times higher than that seen in the semen) in these patients may be due to the absence of ROS scavengers in PF. High ROS levels seen in the PF of endometriotic patients may be due to the absence of ROS scavengers and this may be responsible for the abnormal sperm motion characteristics.