Changes in Inflammatory Marker NLRP3 Before and After Varicocele Repair

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OBJECTIVE: Varicocele is a common correctable cause of male factor infertility. While a considerable portion of patients undergoing varicocele repair see improvement in postoperative semen parameters (including concentration, motility, and morphology), a subset will not observe such improvements in semen quality. Existing literature has proposed the potential utility of biomarkers in predicting infertility and assessing post-surgical outcomes. Although several studies have explored protein biomarkers, few have investigated their dynamic alterations before and after varicocele repair. The objective of this study was to investigate the changes in concentration of NLRP3, an inflammasome component involved in inflammatory signaling, both pre- and post-varicocelectomy.

MATERIALS AND METHODS: Patients undergoing varicocele repair were recruited to participate in this study. Semen was collected before varicocelectomy and 3 months following surgery. ELISA was run using pre- and post-varicocele repair samples. Paired t-test analysis was performed using pre- and post-varicocelectomy concentrations of NLRP3.

RESULTS: Varicocele repair demonstrated a statistically significant reduction in NLRP3 concentration (p-value 0.031) upon comparing pre- to post-varicocelectomy samples, as depicted in Figure 1. However, no discernible correlation was identified between alterations in NLRP3 concentration and fluctuations in sperm concentration, motility, or total motile sperm. Semen parameters were assessed both prior to surgery and 3-months postoperatively. The median sperm concentration prior to varicocele repair was recorded at 10million/mL, while the median sperm concentration following varicocele repair exhibited an increase to 13million/mL. Pre-varicocele repair, the median motility stood at 42%, while post-repair, median motility improved to 56%.

CONCLUSIONS: While this study has elucidated the alterations in NLRP3 levels before and after varicocele repair, future studies should focus on the potential utility of NLRP3 along with other protein markers as reliable biomarkers for predicting improvements in semen parameters with varicocele repair. The identification of such biomarkers may eventually lead to the opportunity to mitigate unnecessary surgical interventions and optimize patient outcomes. Continued research efforts in this domain also have the potential to yield valuable insights into

the intricate pathophysiological mechanisms underlying the variable impact of varicocele on male fertility.