

Mechanical Sterilization by Ultrasound in Male Dog: Hystopathologic Response

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Mechanical sterilization is performed by using ultrasound (US). Its combined thermic and mechanical effects result in impairment of spermatogenesis (Fahim et al., 1977; Leoci et al., 2009). We investigated semen quality, gonadal size and histopathologic outcomes resulting from testicular US application.

Twenty-five clinically healthy mixed breed male dogs, 2.4 ± 2.1 years old, 16.5 ± 3.8 kg of body weight, were examined. Each testis of the conscious dogs was exposed to 1.5 W/cm^2 of US for 5 min every other day for three treatments. Testicles and semen evaluations were made before and 2 weeks after the treatment. Testicular length and width were echographically measured in order to calculate testicular volume (Paltiel et al., 2002). The second sperm-rich fraction of the ejaculate was examined by a computer analysis sperm assisted system (CASA). All dogs were castrated at day 20 and gonads were histologically examined.

We found a statistically significant (Wilcoxon matched pairs signed rank sum test) reduction of the volume of both testes, with left and right testis volumes before treatment being 8.9 ± 3.5 and $9.1 \pm 2.6 \text{ cm}^3$, compared with those after treatment of 4.1 ± 2.2 and $5.6 \pm 1.4 \text{ cm}^3$, respectively ($p < 0.05$). Semen analysis performed after ultrasonic applications showed that all samples were azoospermic. Histology conducted on testis tissue showed interstitial fibrosis, widespread tubular atrophy and ialinization of the basement membranes. In all subjects, no remarkable local or systemic adverse effects, no pain and no skin burns occurred, but after US treatment, testicles, at palpation, exhibited marked tenderness.

Fahim et al. (1975) supposed that US application could cause an ion exchange between the fluid in the seminiferous tubules and rete testis, creating an environment not suitable for spermatogenesis. Our results demonstrated that US at the chosen parameters (frequency, intensity, etc.) leads to an irreversible testis damage due to the interstitial fibrosis.

Our results suggest this method may provide a suitable non-surgical method for male dog sterilization. Moreover, the findings of this work will form the basis of future investigations on the US treatment's long-term effects.