SEMINIFEROUS EPITHELIAL AREA: AS A QUANTITATIVE MEASURE OF TESTICULAR DEGENERATION IN THE BOAR.

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Quantitative morphology (morphometry) allows a direct analysis of the metric properties of structures on the basis of geometric statistical reasoning (Weibel,1979; van Dop et al.,1981). It has been shown that, within a group of infertile men with qualitative normal testes, a subgroup with a poor fertility prognosis could be distinguished by quantitative morphology (van Dop et al.,1981). Similarly, using planas measurements of histologic sections from bull testis, Yuan(1979) found that seminiferous tubular degeneration was more extensive in bulls which had "poor reproductive performance" than in control animals.

Testicular degeneration is one of the most common causes of infertility. In his review, McEntee (1970) has demonstrated that testicular degeneration has been more extensively discussed in the bull than in the boar. Therefore, the purpose of the present investigation was to use quantitative methods to determine the relative amount of seminiferous epithelium in a population of boars.

At a large Chicago abattoir, 300 adult boars were randomly selected in 6 collection visits spread over one year. All testes and epididymides were individually weighed. Tissue samples including the testicular capsule were taken from each testis of each boar. These samples were fixed in Bouin's solution, routinely processed and stained with hematoxylin and eosin. Seminiferous epithelial area (SEA) was determined histomorphometrically by randomly selecting on each histological slide 50 round cross-sections of ----- seminiferous tubules. Each section was projected and both the basement membrane and luminal margin traced on paper at a magnification of 156.5 X. The coordinates of these tracings were then digitized using a Talos digitazing tablet interfaced with an Eclipse S-140 computer. The mean area (cm^2) of seminiferous epithelium per 50 tubular cross sections was taken as the relative SEA value for each testis.

From the caudal epididymis, fluid was collected by the method of Crabo (1965) and fixed in 2% glutaraldehyde. Two hundred caudal epididymal sperm were examined in a wet mount at X 1000 magnification using a phase contrast microscope. In addition, using an ordinary light microscope, 200 cells were examined at X 1000 magnification with Williams' stain in order to determine the percentage of head abnormalities. Abnormal epididymal sperm samples were defined as those having one or more of the following criteria: $\geq$ 5% abnormal heads, $\geq$ 10% abnormal acrosomes, $\geq$ 10% loose heads, $\geq$ 10% defective mid-pieces, $\geq$ 15% proximal droplets, and $\geq$ 15% tail abnormalities.

Out of the population of 300 adult boars, 75 had bilateral abnormal epididymal sperm samples--- (group B). From the rest of the animals 75 boars were randomly selected as a normal group (A). Statistical analyses were performed using simple correlation and Student T-test comparisons.

Relative SEA was larger ($P<.001$) for the normal group A with a mean value (± S.D.) of 8.71 ± 1.3 cm^2 compared to 5.60 ± 1.3 cm^2 for the abnormal group B. For group A 99% of the SEA values were between 6.4 - 11.6 cm^2 , whereas 99% of the SEA values for group B were between 2.6 - 7.7 cm^2. On the other hand, there was no difference between testicular weight (TWT) and epididymis weight (EWT) in the two groups. In the normal group A, TWT and EWT were 346.00 ± 111.26 g and 84.42 ± 28.80 g , respectively, while in the abnormal group B the weights were 322.22 ± 134.84 g and 83.10 ± 30.90 g respectively.

Among normal boars (A) TWT was correlated with SEA ($r=.28$, $P<.01$). There was also a correlation between TWT and EWT in both groups (A and B) ($r=.76$, $P<.001$ and $r=.79$, $P<.001$, respectively). Furthermore, there was a negative correlation between SEA and the incidence of both proximal droplets and abnormal heads within group A --- ($r= -.22$, $P<.05$ and $r= -.22$, $P<.05$, respectively). On the other hand, within group B, there was a negative correlation between SEA and both proximal droplets and abnormal mid-pieces ($r= -.40$, $P<.001$ and $r= -.21$, $P<.05$, respectively). At the same time within group B there was a positive correlation between SEA and distal droplets ($r=.51$, $P <.001$).
Hellmen et al.,(1980) observed that, the most striking morphological variations related to testicular degeneration in the bull were increasing percentages of both proximal droplets and mid-piece defects in the ejaculates.

Conclusions:

It can be concluded then that there is a clear relationship between some caudal epididymal sperm abnormalities (namely proximal droplets, abnormal mid-pieces and abnormal heads) and the relative amount of seminiferous epithelium. Therefore, a high percentages of sperm abnormalities either in ejaculates (Hellmen et al.,1980) or the caudal epididymis could be indicative of testicular disturbances.

Selected references: Crabo,B.:Acta vet. Scand.1965, Suppl,5 Thesis.; Hellmen,E.,Ploen,L.,Setterggren,I. and Nicander,L. Nord.Vet. Med. 1980, (32):423; McEntee,K. In: Pathology of Domestic Animals. Jubb and Kennedy 2nd ed. Vol 1 p.443; vanDop,P.A., Kurver,P.H.J.,Baak,S.P.A.,Oort,J.,Scholtmeijer,R.J. and Stolte,L.A.M. Int.J.Androl. 1981, Suppl.(3):71; Weibel,E.R.: Stereological Methods.1979,vol 1:23; Yuan,Y.D.: Ph.D. Thesis,1979 Cornell University USA.