Altered testicular vascularization and impaired blood supply in the 41,XXY* mouse model for Klinefelter syndrome


Centre of Reproductive Medicine and Andrology, 1Department of Cardiovascular Medicine, 2European Institute for Molecular Imaging (EIMI), 3Institute of Human Genetics, University of Münster, 48149 Münster, Germany

INTRODUCTION

Intratesticular testosterone levels in Klinefelter syndrome (KS) are comparable to controls and Leydig cell function was proven to be normal at least in vitro [1]. Therefore, testicular vascularization changes came into focus as a potential factor contributing to hypogonadism [2].

METHODS

We performed enhanced ultrasound based analysis of the testicular blood support in our 41,XXY* mice (Fig.1). Adult male 41,XXY* (n=5) and control mice (n=6) underwent ultrasound analyses with the Non-Targeted Contrast Agent Vevo MicroMarker. The agent containing gas filled micro-bubbles was administered intravenously. After initial perfusion, micro-bubbles were destroyed by high ultrasound pressure and the reperfusion period was analysed. In parallel, electrocardiograms (ECGs) were taken. Afterwards mice were sacrificed and testes removed for histological analysis of vascularization.

RESULTS

Whilst ECGs did not reveal differences in heart function, the reperfusion time for testes was significantly increased in 41,XXY* mice (XXY*: 28.8± 1.7s; XY*: 19.9± 2.8s, Fig.2c). Testes of 41,XXY* mice (Fig.2a) and the area covered by blood vessels (XXY*: 0.025 ± 0.003mm²; XY*: 0.040 ± 0.002mm², Fig 3a) were significantly smaller. Testicular blood vessel areas of adult males were assigned to four categories (I=80μm², II=80-1000μm², III=1000-5062μm², IV=5062μm²). The blood vessel area of categories I and II was significantly decreased in 41,XXY* mice (p=0.0001). Taking the testis area into account, the area covered by vessels of category II and III is significantly elevated in KS mice. Blood vessels of category IV were missing in KS testes.

CONCLUSIONS

These functional and morphological data strengthen the assumption that the observation made previously contributes to the endocrine phenotype seen in KS pointing to an affected vascular system in the disturbed testicular tissue of males with supernumerary X.

References


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