Ischemia of tissue in animals in non FD oriented research

There are presented studies in which tissues with impaired blood supply were left in animal bodies despite the author´s aim of the study. One study deals with the impact of selective imparement of lymph circulation only. This studies were not performed in connection to investigation of Fortyn devitalisation.

Crowe, Cushing and Homans in 1909 investigated the effect of hypophyseal transplantation following total hypophyseoctomy in canine. Hypophysis was transplatated into the rectus muscle, bone marrow of tibia, cerebral cortex. Crowe concluded that transplantation was unsuccessful since the graft became replaced by fibrous tissue after some time but that symptoms of hypophyseoctomy can be postponed by transplanting hypophysis into cerebral cortex (18).

Thompson in 1908 investigated the faith of dogs with ligated parathyroid glandules. He found that after ligation of all parathyroid tissue dogs did not die of tetany but that chronic symptoms of a progressive loss of weight, strength coupled with diminished resistance to infection developed. Dogs eventually died in stuporous condition without tetany. According to his account ligation of the gland was followed by its hypertrophy, then he found leukocyte infiltration and central necrosis. Removal of the gland was completed by total fibrosis. Total fibrosis was found as early as 7 days after ligation, on the other hand he found persistence of parathyroid gland as long as 65 days after ligation (19). Troell in 1916 investigated the effect of vessels ligation as a substitute for splenectomy in dogs and guinea pigs. His conclusion was that cutting off a considerable portion of the spleen's blood vessels lead to a general permanent reduction of the organ volume with anatomical reduction of the spleen specific tissue over a short period of time. He found more pronounced diminution of the organ in guinea pigs which he thought is due to the difference of spleen circulation which in guinea pigs is less favourable for presence of collateral circulation (20). Sahin and cal. in 2000 studied the effects of splenic artery ligation on erythrocyte and platelet counts in rats in secondary hypersplenism model. Hypersplenism was modelated by ligation of splenic vein at the splenic hilus. Ligation of hilus artery was performed in one group 6 weeks later. Histopathological examintation revealed an increase in fibrotic tissue, congestion, necrotic areas, trabeculacere and vessels thickening in this group (21). Griffiths and cal. investigated different types of spermatic vessels ligation in dogs. Concomitant ligation of veins and arteries resulted in puppies to great swelling followed by gradual diminution and atrophy of testes. There were found three distinct outcomes in adult dogs, sloughing of the testes, complete atrophy or temporary fatty degeneration with subsequent recovery. They were unable to establish the causes of differences of these outcomes (22).

Awasum experimented with ligating of ovarian arteries and veins in dog bitches as a potential sterilisation method in 2008. He evaluated ligated ovaries 32 weeks later. There were found necrotic ereas, fibrotic degeneration of follicules and ovarian stroma, mononuclear infiltration but also ovarian stroma with developed corpus lutea on histological examination. Macroscopically the ovaries were in some cases significantly regressed and degenerated but in others the changes were far from obvious. Awasum concluded that degeneration was impaired by neovascularisation from ovarian attachment to the retroperitoneal tissues and likely from the subcutaneous supplies. The only adverse effect reported was temperature peak of 40 degrees C which was attributed to traumatic individual reaction to the surgery (23).

Morgan in 1920 looked for alternative approach to castrate hens so as to avoid lethal haemorrhage which complicated their castration. He found that prompt degeneration and absorption of testis can be achieved by tying tightly a silk threat around the testis attachment to the body wall only if the entire testis is included in the ligature (24). Zhang and cal. in 2008 examined the effects of disturbance in lymph circulation on renal fibrosis in rats. A selective ligation of lymph vessels was performed while sparing arterial and vein circulation. They

found tubular damage, tubulointerstitial fibrosis and expansion of mesangium which was exacerbated by contralateral nephrectomy more than by contralateral lymph duct ligation (25).

Sheu et cal. examined the effects of tumour ischemia on metastasis in mice model. The ischemia injury of the tumour induced by inoculation of mice with Lewis lung carcinoma was induced by tourniquet binding of tumour bearing hind limb. A four to five fold reduction in lung metastasis was found compared to control mice which underwent sham injury or banding of the non tumour bearing hind. The reduction of metastasis was thought to be due to involvement of host lymphocytes. In addition lower metastatic potential was found after re-implanting ischemia treated tumour in comparison to tumour not exposed to ischemia (26).

Kamijo et cal. performed a similar experiment when they observed the effects of tumour ischemia on lung metastasis. The ischemia was induced by tight ligation in mice inoculated by spontaneous murine osteosarcoma. They confirmed a reduction in numbers of lung metastases after temporary ischemia of inoculated tumour. A reduction in number of lung metastases was supposed to be due to production of reactive oxygen species (27).

Denekamp et cal. directly examined the effects of vascular occlusion on tumour growth in mouse model. Subcutaneously implanted tumour was clamped for 30 minutes to 24 hours by D shaped clamp across the base of the tumour. A local cure of the tumour was achieved if the occlusion lasted at least for 15 hours. The effect on tumour growth was proportional to the duration of clamping. The effect being explained by immediate loss of cell viability and inability of capillaries to recover after removing clamp (28).

Parkins et cal. studied the effect of temperature and pH on tumour cell death in subcutaneously implanted murine tumour CaNT with occluded blood supply for 1 to 20 hours. They found that the survival of tumour cell decreases with prolonged period of time. A drop in the core temperature of vascular occluded tumour increases tumour cell survival and reduces drop in extracellular pH (29).

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