A Model for Investigation of Haemangioma Elimination

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Abstract. The hen crest, whose macroscopic and microscopic characteristics are similar to those of the human haemangioma, was studied as an experimental model. This permits assays of different types of treatment and the analysis of the effectiveness and limitations of argon (AR) laser photo-coagulation.

INTRODUCTION

At the present time, laser surgery is the most effective and least traumatic treatment of haemangiomas. Therapeutic efforts try to obliterate the vascular net, substituting it with fibro-connective tissue.

Following argon laser treatment, there is necrosis of the epidermis that is repaired spontaneously and progressively to leave little significant scarring. Within the dermis, in the first stage of treatment, tissue necrosis occurs that progresses, as a second stage, to an acute inflammatory infiltrate. The third stage is the re-absorption of the necrotic tissue, while within the vessel there is thrombosis that progressively organizes itself, leading to blanching of the lesion.

Experimental models are used in medicine for the perfecting of treatments. An experimental model has not yet been described for therapeutic practice of haemangioma. In the literature there are descriptions of blood vessel tumours with typical angiomas, which are produced by the introduction of chemical poisons, e.g. succinic acid 2.2. dimethylhydrazine (1).

Koppang and Rimeslatten (1976) (2) have described haemangiosarcomas of the liver after nitroso-dimethylamine administration, and Prout and Davis (1977) (3) described haemangiosarcomas in the bladder by contact with polyvinyl alcohol. Vascular tumours after 1,2 dihydrochloride-dimethylzidine and 1-Aetic-2 phenhydrazine administration have also been reported by Izumi et al (4), as well as Toht (5).

However, most human haemangiomas are congenital (6) and the lesions referred to in the literature do not have this characteristic. We have observed that the crest of the hen, a physionomic characteristic, has a structure similar to that of the human haemangioma. Therefore, it was possible to use the hen crest for assaying different methods of treatment, the results of which could serve to enhance the accuracy of human haemangioma blanching. Thus, we have studied this crest as a 'typical haemangioma', analysing its histological characteristics in comparison with the human haemangioma, and performing different trials which could lead to better results in our medical practice.

MATERIALS AND METHODS

The adult common hen, whose habitat and diet is standard in our region was used. We have evaluated the crest tissue in comparison with the human haemangioma; (i) macroscopically, noting its texture and performing photographic controls, and (ii), microscopically, with a Zeiss microscope equipped with an orthoplan optic. Processing of the histological samples was done by routine automatic technique, after fixation in 10% formalin, and stained with Haemotoxlin-Eosin and Masson's Trichrome. We attempted different treatments of the crest with an argon laser, in order to find the best parameters for elimination of the enlarged vascular net which is the cause of this 'lesion'.

An argon laser (VI.TI.EMME., Turin/Italy) with 5W maximum power emission (488.8–514.5 nm) was employed. The different photo-coagulation trials were done with a 0.5 mm...
beam diameter, a 0.2 s pulse-duration with 0.2 s between pulses, and at 0.5, 0.75, 1, 1.5 and 1.75 W, which are the parameters usually recommended for human haemangioma elimination. All animals were injected at the base of the crest with a local anaesthetic solution of 2% Mepivacaine without vaso-constrictor (Scandicain).

Different protocols of blanching were tried in approximately circular areas of 1 cm diameter and compared, to analyse which gave the best results.

Histological examination of treated tissue was carried out on punch biopsies taken immediately after laser application, and at 24 h, 48 h, 7 days, 14 days, 28 days and 3 months, after treatment.

RESULTS AND CONCLUSIONS

Macroscopically the hen crest has a similar appearance to the human tuberous haemangioma. On the surface of the crest there is evidence of significant keratinization and ruggedness with irregular undulation of the surface, as well as a port-wine colour, which is deeper in some areas than that of the human haemangioma.

On histological examination (Figs 1–2) the hen crest has a similar structure to the human haemangioma; the epidermis has areas of increased keratin. The superficial and deep dermis possess a large aberrant vascular net with different capillary abnormalities, a situation that also occurs in human haemangiomas as described by Shakespeare and Carruth (7). It was noted that the afferent vessels came from the fibrotic septum zone of the crest. In the deep dermis fewer vessels were observed than in the superficial dermis. The vessels of the deep dermis represent connections between the afferent vessels of the septum and the vascular net which is distributed throughout the superficial dermis.

In human haemangiomas, the lumen of the vessels appear enlarged and ectatic. The vessels are of different sizes, visibly dilated, contain blood and are surrounded by connective tissue (Fig. 3), a situation that also arises in the hen crest. The crest, according to Ohmori and Huang's (8) description, could be classified as being between type II and III, with respect to its degree of vessel dilation.

The different laser treatments performed in this study were done with the aim of determining the modality and optimal parameters for elimination of the crest vascular net, and attempted to achieve the most effective blanching with the minimum of damage to the epidermis. The results show 1.75 W power to be most effective, operating in pulses of 0.2 s with 0.2 s between pulses. The medium density of