

The Okuda Papers: an extraordinary – but unfortunately unrecognized – piece of work that could have changed the history of hair transplantation

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Key words: hair follicle innervation – hair transplant surgery – hair transplantation – heterologous hair transplantation – punch grafting – Hair Follicle

Accepted for publication 29 December 2014

Only a few fortunate doctors have had the privilege to read the so-called Okuda papers (1), probably the most comprehensive piece of work ever written about hair transplantation by a single physician. The articles, published in 1939, were written using old kanji (Japanese pictographs) and so are unintelligible in part to modern Japanese medical readers. Because of the outbreak of World War II, this seminal work remained virtually unknown outside Japan.

Eventually, the Okuda papers were rediscovered and translated into English by Dr. Yoshihiro Imagawa (a retired gynaecologist trained in the USA, father of the Japanese hair transplant surgeon Kenichiro Imagawa) in 2004 (2). We have arranged for all the original articles and translated sections of the Okuda papers as well as other relevant articles (3) to be available to the scientific community through a free download via the ISHRS (International Society of Hair Restoration Surgery) web site (<http://www.ishrs.org/content/okuda-papers-0>).

The scientific contents of the Okuda papers

Titled 'Clinical and Experimental Study of Living Hair Transplantation', the full work is 50 pages long and includes 100 figures. It was divided into five different sections, all of which appeared in the same issue of the Japanese Journal of Dermatology and Urology.

Section I: In this section, Okuda describes how he performs the hair punch graft technique and summarizes the clinical evolution of 30 cases of autologous hair transplantation at days 2, 5, 10, 20, 30, 60, 100, 200 and 300 in a very detailed manner.

Dr. Okuda performed his hair transplantation technique mainly in scarring alopecias of the face (eyebrows, scalp, moustache) and pubic hair loss. He claimed 100% growth success in all of his over 200 cases, noticing that the hair grew in any cutaneous location where it had been implanted.

He used personally designed trephines (punches) to remove skin plugs containing hairs (Fig. 1). After local anaesthesia, the punch was rotated deeply to the level of the subcutaneous fat layer, taking particular care with hair direction and depth of the hair bulbs. The incised plug was pulled up with tweezers, and the subcutaneous attachments were then cut with fine scissors. Smaller donor holes were allowed to heal spontaneously, and only those that continued to bleed were stitched.

He preferred to use punches of 2.0, 2.5, 3.0 and 3.5 mm in diameter, because with smaller punches (of 1.0 mm), he noticed that the number of intact hair follicles was very low.

Okuda noted that recipient sites should be prepared with punches 0.5–1.0 mm smaller than the diameter of the grafts. No sutures were required to hold them in place.

He described how almost all transplanted hairs were shed 20–30 days after transplantation, growing back again around 90 days after transplantation. The experience of many years of hair transplantation has demonstrated that these detailed descriptions of the changes that occur from when the hair graft is inserted in the recipient site until full hair growth is achieved were absolutely accurate (4).

In addition, Okuda was the first to experiment with hetero-transplantation. He recruited 14 patients of similar and dissimilar blood groups and among related and unrelated individuals. In all cases, the grafts became necrotic and no hair growth was obtained in any of the patients. Furthermore, he pioneered body hair transplantation because he mentions how he also tried brow, axillary and pubic hair as donor areas, but concluded that scalp hairs were easier to harvest and gave the best results.

Section II: In this section, Okuda described the histological picture of the evolution of a punch hair graft transplanted into the recipient site, from its insertion until its complete regeneration. For this purpose, he transplanted hair grafts from the scalp to the upper arm of two patients. Okuda painstakingly described the histological picture of biopsies obtained 2, 7, 14, 30, 60, 80 and 100 days after the transplant. He noticed signs of acute inflammation in the first days after the transplant with the presence of PMNs and proliferation of blood vessels; after 10–14 days, the acute inflammation reduced and became lymphocytic. At 60 days, he noticed that the perifollicular connective tissue of the transplanted grafts cells proliferated, forming projections to the surrounding dermis. I found this observation interesting because the perifollicular mesenchyma (dermal sheath) is presently the object of intense research due to the presence of dermal stem cells and its participation in hair follicle regeneration and the wound healing response (5–7).



Figure 1. Original Okuda Hair Transplant Punches (1939).

The histological picture in all cases of hetero-transplantation revealed that the hair grafts necrotized and disappeared in 4 weeks, showing a much more diffuse inflammation (with abundant eosinophils) than in the cases of auto-transplantation.

Sections III and IV: He studied the clinical and histological changes of hair transplantation in rabbits, guinea pigs and a calf. The results were very similar to those in humans, the only difference being that the transitory shedding after the transplant occurred earlier (10–14 days) and the hair started growing at 50–60 days as opposed to 80–90 days in humans. In all three species, he noted donor dominance in regard to hair colour: white hair remained white when transplanted into a black region, and black donor grafts remained black in a white recipient zone.

The experiments with hetero-transplantation were a complete failure with all the animals, except in a single case when using two rabbits from the same litter.

Section V: In this section, Okuda reports the hair follicle innervations after auto- and hetero-transplantation both in animals and humans using silver impregnation staining methods. In auto-transplantation, he noted that around 30 days after the transplant the nerves regenerated, an observation that was confirmed more than 40 years later (8,9). In hetero-transplantation, he described the complete degeneration of nerves (with disappearance of nerve staining) 3 weeks after the transplant.

Conclusion: Why are the Okuda papers so important?

The scientific papers of Okuda could have changed the history of hair transplantation, but as a result of external, non-scientific circumstances, they remained unknown and punch graft transplantation had to be rediscovered 20 years later by Dr. Norman Orentreich (4). Okuda should be recognized not only as a true innovator but also as a fine example of how a meticulous researcher should work. He was so keen to prove the success of his technique obtained in humans that he performed the same experiments in a variety of animal models with the same results. It is a shame that such outstanding research remained unavailable to most dermatologists, hair surgeons and hair researchers for more than 70 years. We hope that this article serves as a belated tribute to the figure of this exceptional scientist and contributes to the dissemination of his work.

Acknowledgements

We would like to thank Dr. Kenichiro Imagawa (hair transplant surgeon) and Dr. Shigeki Inui (Associate Professor, Department of Regenerative Dermatology, Osaka University School of Medicine) for tracking the life of Shoji Okuda and divulging his work. We thank Dr. Imagawa's father, Dr. Yoshihiro Imagawa for performing the translation of the original Okuda papers into English. We thank Mrs. Victoria Ceh, the executive director of the ISHRS (International Society of Hair Restoration Surgery) for her thoughtful comments and for helping in posting the PDF articles in the ISHRS website. We gratefully acknowledge Japanese Dermatological Association for providing permission and the scans of the original Okuda Papers.

Author contribution

Both Francisco Jimenez and Richard Shiell wrote the paper and approved the final version.

Conflicts of interest

The authors have declared no conflicting interests.

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