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Implementation of the two-stage operation technique for the autotransplantation of teeth with closed apexes – a preliminary report

The retention of tooth vitality after transplantation is an essential issue connected with the bedding-in of the transplanted teeth. According to Schendel (4), revascularisation together with reinnervation of the dental pulp contribute to the functional acceptance of the transplantation; due to the nerve regeneration nociceptive stimuli may be received and vascular regulation of the pulp takes place.

Kristerson (2) states that in the case of successful autotransplantation the tooth does not demonstrate any inflammatory changes in the pulp or the periapical tissue and that neither resorption nor root ankylosis takes place, thus accepting the pulp vitality retention as the criterion for the evaluation of the operation's success.

Basing on the example of premolar teeth, it can be stated that it is best to transplant teeth at the third and fourth levels of development (the root is formed in ½ - ¾ of its length), whereas endodontic treatment is necessary in the case of transplantation of completely formed teeth (seventh level) (2).

A classic autotransplantation procedure consists in removal of a tooth and its simultaneous implantation into a different part of the alveolar arch. In 1988 Nethander et al. (3) performed the procedure of autotransplantation of teeth with completely formed roots by placing them in previously prepared dental alvelouses, which would be left to heal for 14 days prior to the transplantation. The implantation of a tooth into the vascularised connective tissue of the healing wound facilitated the bedding-in of the autotransplant. The author achieved results ranging from 77% to 72% of successful cases within the periods of one and five years of observation, respectively; however, he did not mention if the transplanted teeth remained vital.

This work is an attempt to answer the question of the feasibility of sustaining the vitality of the pulp of a transplanted tooth with a closed apical foramen with the implementation of the two-stage technique described by Nethander (3).

CASE DESCRIPTION

The study encompassed six patients, between the ages of 17 and 38, who underwent six tooth autotransplantation procedures (four molars and two canines) with the implementation of the two-stage technique; the teeth were under observation for a period of between one and a half and three years. In five cases endodontic treatment was necessary between the third and sixth

weeks after the procedure due to pulp necrosis. In one case, that of a 17 year-old patient, after two and a half years of observation, the canine pulp remained vital despite the fact that the tooth ventricle and the root canal demonstrated symptoms of partial obliteration (Fig.1,2,3).

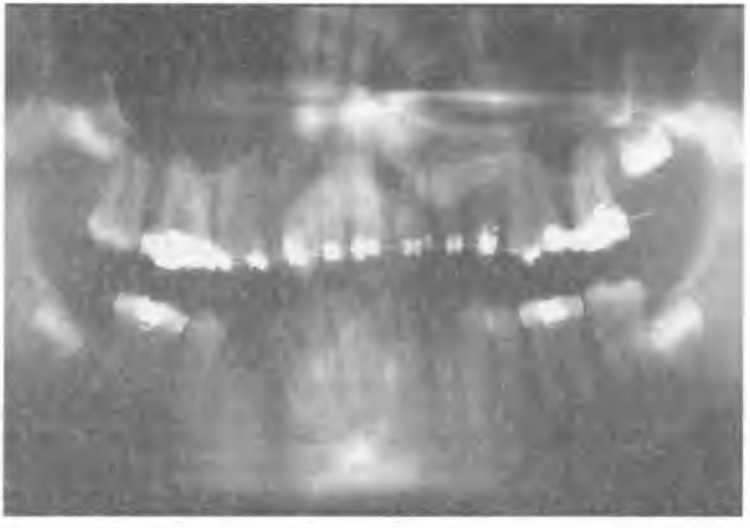

Fig. 1. Patient J. K., panoramic roentgenogram prior to treatment

Fig. 2. Patient J. K., spot roentgenogram directly after procedure

Fig. 3. Patient J. K., spot roentgenogram two and a half years after the procedure

CASE STUDY

According to Kahnberg (1), the best results are obtained in transplantation of teeth with partially formed roots and widely open apical foramens, precisely for the reason of the high possibility of revascularisation. Teeth not fully-formed demonstrate a lower percentage of pulp necrosis following autotransplantation, which together with insignificant damage to the periodontum may substantiate a good prognosis in the case of transplantation of such teeth (2).

In the above-mentioned cases, the two-stage technique of autotransplantation described by Nethander et al. (3) as particularly useful for the transplantation of fully-formed teeth was implemented. According to the authors, insufficient nutrition of the root surface of the autotransplanted fully-formed human teeth may account for the high rate of failure after the transplantation. It seems that insufficient nutrition is caused by the distance between the root surface and the bone of the artificially created dental alveolus and the occurrence of a clot between them. It may be improved by the implantation of a tooth into the vascularised connective tissue of the healing wound. In conclusion, the authors stated that with the implementation of the two-stage technique of autotransplantation, teeth with completely formed roots may be successfully transplanted (3), a statement substantiated by the above-mentioned procedure of canine autotransplantation whose pulp remained vital two and a half years after the procedure.

Endodontic treatment out of choice was proposed following autotransplantation of teeth with closed apexes as routine procedure; however, it has been shown that the pulp of a tooth with an obliterated ventricle is not subject to necrosis more often than the pulp of a tooth without an obliterated ventricle after autotransplantation. Siers et al. (5) currently (2002)

propose avoidance of endodontic treatment directly after autotransplantation even in the case of teeth with completely closed apexes; instead, they recommend tooth monitoring with regard to the occurrence of pathological symptoms or alternatively signs of revascularisation. Complete obliteration of the tooth ventricle does not exclude the possibility to sustain the pulp vitality and a simultaneous lack of widening of the periodontium fissure and pathological symptoms in the parodontium results in the lack of necessity for root canal treatment.

CONCLUSIONS

To conclude, a situation where following autotransplantation there is reconstruction of the structure of the periodontium ligament with simultaneous reinnervation and revascularization of the pulp should be considered ideal. My observations allow me to suspect that in the case of autotransplantation of teeth with closed apexes with the implementation of the two-stage technique, there is a possibility for the occurrence of reinnervation and revascularisation, which should induce a careful approach to the question of routine endodontic treatment of such teeth following autotransplantation and encourage a thorough observation of such teeth before making a decision on pulp removal. This statement requires, however, further clinical research and should at the moment be perceived as preliminary.

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SUMMARY

Transplantation of teeth with incompletely formed apexes demonstrates a statistically better retention than the transplantation of fully-formed teeth because of the possibilities for reinnervation and revascularisation. However, with regard to the autotransplantation of teeth with completely developed roots, routine endodontic treatment is proposed, as the possibility to retain the vitality of dental pulp is doubtful. In this work the author wishes to present the implementation of the two-stage technique for the transplantation of fully-formed teeth. Observations confirm the possibility for reinnervation and revascularisation occurring after autotransplantation of teeth with closed apexes, which should encourage a cautious approach to the question of routine endodontic treatment following autotransplantation.

Zastosowanie metody dwuetapowej do autotransplantacji zębów z zamkniętymi wierzchołkami – doniesienie wstępne

Przeszczepy zębów z nieukończonym rozwojem wierzchołków wykazują statystycznie lepsze utrzymanie niż przeszczepy zębów całkowicie uformowanych ze względu na możliwość reinerwacji i rewaskularyzacji. W odniesieniu natomiast do autotransplantacji zębów z ukończonym rozwojem korzenia proponuje się rutynowe leczenie endodontyczne, poddając w wątpliwość możliwość utrzymania się żywotności miazgi. Autor przedstawia w pracy zastosowanie metody dwuetapowej do przeszczepienia zębów całkowicie wykształconych. Dokonane obserwacje potwierdzają możliwość wystąpienia reinerwacji i rewaskularyzacji po autotransplantacji zębów z zamkniętymi wierzchołkami, co powinno skłonić do ostrożnego podejścia do problemu rutynowego leczenia endodontycznego po autotransplantacji.