The Changes in the Nerve Fibers of the Dental pulp of Jaw Tumor —Part One Squamous Cell Carcinoma—

By

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Introduction

Oral tumors cause destruction and resorption of the jaws and teeth. Relation between the tumor tissues and the dental pulps of teeth is a subject of interest. The reports published to date however are limited in number and the subjects covered center around metastasis of tumor tissue to dental pulps. Histopathological investigations of the changes in the dental pulps of teeth surrounded by tumor tissues seem to have never been discussed.

The author therefore made observations of the changes of the nerve fibers of the dental pulps of teeth in tumor lesion.

For this report, investigations of three teeth taken from the lesion of squamous cell carcinoma are described.

Materials and method

Four lower left anterior teeth of a 68-year-old woman who was under treatment for squamous cell carcinoma after a histopathological diagnosis constitute the materials.

The teeth were extracted because of their looseness and hindrance to radiotherapy. Figure 4 is a chronological diagram showing the events leading to the extractions.

Figure 5 is a radiograph of the extracted teeth. The left lower first premolar was excluded from this study because it had been treated with root canal filling. Macroscopic examinations of the other three teeth did not reveal caries or root resorption.

The three teeth were fixed immediately with a fixation solution (75.0ml of saturated solution picric acid, 25.0ml of neutral formalin, and 1.0g of trichloroacetic acid). A solution consisting of equal portion of 20% solution of sodium citrate and 50% solution of formic acid was used for decalcification. Paraffin was used for embedding. The sections were stained by urea-silver nitrate technique (Figs. 1 ~ 4).

Results

1. Left lower canine:

The coronal pulps had disappeared completely. The root canal was filled with lique-
fied pulp tissues composed of loose connective tissues. Neither odontoblasts nor pulp cells were found in the pulps. Dilated and congested blood vessels were found remaining (Fig. 6 & 7). Few nerve tissues were found and none had healthy appearance of normal nerve tissues. The few nerve fibers found along the blood vessels were severed in places and expanded. They resembled beads (Figs. 6, 7).

2. Left lower lateral incisor:

The pulp tissues had liquefied and disappeared excluding the apical portion of the root canal. The pulp tissues had liquefied and consisted of loose connective tissues and dilated blood vessels. Only fragmental nerve fibers were observed along the blood vessels. No healthy nerve fibers were found (Figs. 8, 9).

3. Left lower central incisor:

Dental pulps as a whole were congested. The coronal pulps cells showed reticular atrophy. In the root canal pulps, the fibers were abundant but the pulp cells were few.

Vaculoar degeneration and atrophy caused constriction of the odontoblast layer. The nerve tissues as a whole were normal. A bundle of nerve tissues ascended from the apical portion to the midsection of the pulp.

Fine individual nerve fibers ran vertically and horizontally and formed nerve plexus adjacent to the pulp walls. Detailed observations showed expansion with odontoblasts at the terminals of nerve fibers (Figs. 10～13).

**Discussion**

The literature available regarding relation between the jaw tumors and the teeth has been very limited. Most of them treated mainly metastasis and development of jaw tumors to dental pulps. Those treating the status of dental pulps are almost nil. The author therefore made observations of the nerve fibers in the dental pulp of teeth in tumor lesion.

For this report, three teeth from squamous cell carcinoma lesion were investigated.

The dental pulp showed, more or less, degenerative changes and the changes were more marked in the coronal pulp than in the root pulp. In the coronal pulp, the structure of pulp tissues disappeared and liquefied. This is considered attributable to disturbance of blood circulation.

M. Masaki (1933)\(^1\) reported that the root surface of the tooth in tumor tissues was surrounded primarily by connective tissues. The author of the present report considers that it is these connective tissues that cause disturbance in blood circulation.

M. Ueno (1960)\(^2\) described that a large bundles of nerve fibers in the dental pulp ascended to the coronal portion, then branched out in many individual fibers, and spread out in fan-shape. According to the findings for the present report, an extreme decrease in nerve fibers was seen in the left lateral incisor and the canine surrounded...
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completely by tumor lesion. The remaining nerve fibers showed Waller's degeneration. In the central incisor at an end of the tumor lesion, a still healthy bundle of nerve fibers ascended as far as the coronal portion. The nerve fibers branching out at the coronal portion formed Raschkow's nerve plexus directly beneath the odontoblast layer. Fine individual nerve fibers were seen penetrated into the odontoblast layer, but the ends of the nerve fibers were not clear. The nerve fibers may be considered to disappear gradually, beginning with those adjacent to the center of the tumor, along with degenerative changes of the dental pulps. The limited number of the materials used and the fact the materials had been subjected to a several types of therapy do not provide enough ground for reaching a conclusion that the tumor itself is the causative factor for occurrence of the foregoing developments.

Summary

Observations were made of the changes in the nerve fibers of dental pulp. Investigations were made of the teeth taken from tumor lesion diagnosed as being squamous cell carcinoma.

Nerve fibers disappeared gradually, beginning with those near the center of tumor lesion, along with degenerative changes of the dental pulps.

Whether such findings were caused by the tumor itself could not be concluded due to the limited materials and to the types of therapy to which the materials had been subjected.

The author intends to continue investigations on a various kinds of tumors.

References


Fig. 1  Tumor lesion of oral cavity.

Fig. 2  Radiograph of tumor area in the left mandible.

Fig. 3  Microscopic section of tumor lesion.

Fig. 4  Treatment history.

Fig. 5  Radiograph of the extracted teeth.

Tumor histology:
- Pathologic diagnosis: Squamous cell carcinoma

Treatment history of the teeth extraction:
- B. L. M. solid type 30 mg × 2
- Pathologic diagnosis: Squamous cell carcinoma
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Fig. 6 The severed and expanded fibers.

Fig. 7 The bead-like nerve fibers.

Fig. 8 Degenerated pulp.

Fig. 10 A bundle of nerve fibers.
Fig. 9  Point-like cutting nerve fiber.

Fig. 11  Fine and singular nerve fibers running vertically and horizontally.

Fig. 12  The nerve plexus.

Fig. 13  Expanded nerve fibers.
顎腫瘍による歯髄神経線維の変化
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口腔領域における腫瘍の場合，腫瘍の増大と共に顎骨並びに歯牙の破壊吸収をともなう。これら腫瘍内に植立した歯牙歯髄組織と腫瘍との関係については，従来の報告を見るにその数は極めて少なく，また腫瘍組織の歯髄転移について述べたものがほとんどである。腫瘍組織にとり囲まれた歯牙歯髄組織の変化，なかでも神経組織の変化を検査したものは皆無である。そこで著者は腫瘍内に植立した歯牙歯髄神経の変化を観察した。

今回は，扁平上皮癌の病理組織学的診断のもとに，加療中の下顎病巣より得た歯牙について観察した。
その結果，歯髄神経線維は病巣の中心に近いものから歯髄の退行性変化と共に徐々に消失している所見を得た。しかしながら，本所見が腫瘍自身によるものかどうかは，材料が少ないうち各種の治療が行なわれていることを考え併せると断定出来ない。

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