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### Oral health in frail elderly

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## Chapter 6

Frail elderly with transmandibular implants are at risk for developing severe oral complications



## Chapter 6.1

# Patients with transmandibular implants are at risk for severe complications when becoming frail

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Arie R. Hoeksema, Gerry M. Raghoebar, Arjan Vissink and Anita Visser. Patients with transmandibular implants are at risk for severe complications when becoming frail. J Oral Maxillofac Surg 2015;73:1493-1498.*

## Abstract

Early in the implant era, transmandibular implant systems were used for retention of implant-supported mandibular overdentures in the severely resorbed mandible. These transmandibular systems are in a high need of very thorough aftercare especially when patients become frail and care dependent. As a result, oral care often gets less attention in frail elderly and/or the patient is not able to keep the needed level of oral care. Care providers are often unfamiliar with the level of oral care needed to preserve transmandibular implants in a good condition too. In this case series it is shown that frail elderly who are not able to keep the oral care at the desired level and in whom the caregivers did not provide the needed level of oral care are at risk for severe complications including chronic pain and fracture of the mandible.

## Introduction

Since the early seventies, dental implants are used worldwide to retain mandibular overdentures.<sup>1,2</sup> Early in the implant era, transmandibular implant systems, i.e., systems of which the posts are inserted *through* instead of *in* the mandible, were commonly applied in severely resorbed mandibles.<sup>3-5</sup> These systems have been reported to bear a high risk on developing severe peri-implant related complications.<sup>6-8</sup> Due to this rather high complication rate and complexity of the treatment modality of these transmandibular implants according to Bosker<sup>6-8</sup> and Small<sup>9</sup>, the use of transmandibular implants has been abandoned later on and short endosseous dental implants are applied instead<sup>7,10</sup>

Although transmandibular implants are no longer used in dental rehabilitation of patients with severely resorbed mandibles, there are still many patients that have been provided with a transmandibular implant in the past. These subjects age, and may become fragile and care dependent. When becoming frail and care dependent, the level of oral health care often deteriorates, e.g., due to cognitive impairment, mobility problems or decreased manual skills.<sup>11</sup> As a result, the frail elderly themselves, and often also their care providers, do not keep the required level of oral hygiene and professional aftercare posing these fragile elderly at a high risk of developing severe peri-implantitis. In this case series, major complications are described that may occur in frail elderly provided with a transmandibular implant. The present study was based on analyses of routine care. Owing to the retrospective nature of the present study, it was granted an exemption in writing by the University of Groningen institutional review board. The present study followed the Declaration of Helsinki on medical protocol and ethics.

Fig. 1 Patient; 95 year-old woman with a persisting fistula of the chin with discharge.



Fig. 1A Fistula in the chin region as a result of peri-implantitis.



Fig. 1B Severe inflammation of peri-implant tissue.

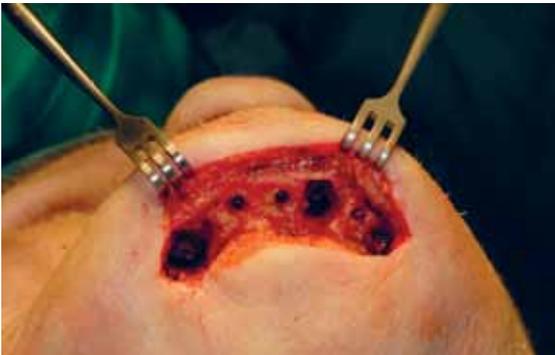


Fig. 1D The transmandibular implant according to Bosker was removed under local anesthesia. After removal, large defects remained in the mandible.

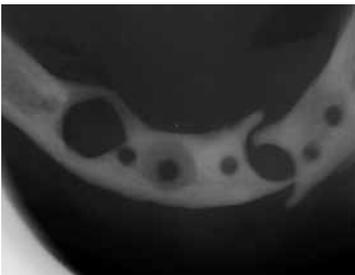


Fig. 1E Axial radiograph of the mandible one week after removal of the transmandibular implant showing a fracture.



Fig. 1F Axial radiograph of the mandible after putting the patient on a soft diet. The fracture site shows signs of appropriate healing.

## Case reports

### Case 1

A 95 year-old fully care dependent fragile woman living in a nursing home was referred to the Department of Oral and Maxillofacial Surgery of the University Medical Center Groningen by her family physician for treatment of mandibular pain and a persisting fistula with discharge in the chin region (Fig. 1A). Antibiotics had been described by the family physician without result.

Five years ago, the patient had been admitted to the nursing home. Since then she had not visited her dentist for routine check-ups. In contrast to her physician, we removed the overdenture. She was provided with a transmandibular implant according to Bosker that had been inserted 20 years ago. The overdenture and the mesostructure were fully covered by food debris, dental plaque and calculus. The peri-implant tissues were severely inflamed (Fig. 1B). Around the posts of the transmandibular implant deep pockets were probed. Clinically and radiographically, severe peri-implant bone loss was noted around the posts (Fig. 1C).

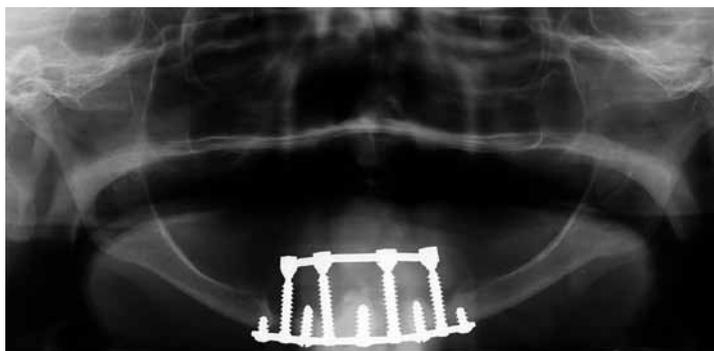


Fig. 1C Orthopantomogram. Severe bone loss was observed.

The transmandibular implant was removed under local anesthesia without problems (Fig. 1D). One week after removal of the transmandibular implant, however, the mandible fractured spontaneously (Fig. 1E). The fracture was treated conservatively, i.e., with watchful waiting and a soft diet.<sup>12</sup> Six weeks after surgery, the fractured site had healed (Fig. 1F). No conventional mandibular denture was made as the jawbone was so severely resorbed that no functional denture could be made.

Fig. 2 An 85 year-old woman with severe peri-implantitis. (This case has been previously published in Gerodontology<sup>13</sup> and was reprinted here with permission of the publisher and editor of Gerodontology)



Fig. 2A The posts were covered with calculus.

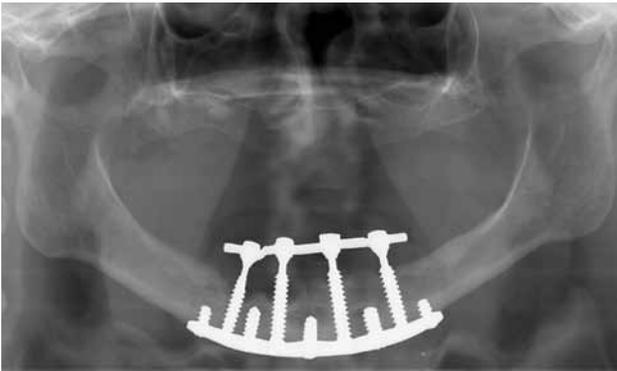


Fig. 2B Orthopantomogram. Severe loss of bone loss is seen around the implant posts of the transmandibular implant according to Bosker.

### Case 2

An 85 years-old fragile woman with dementia syndrome was admitted to a nursing home. She was complaining of pain, which pain was interpreted by the executive care providers as pain originated from her dentition. The nursing home dentist was asked to check the patient. He did not find a natural dentition as expected but a set of complete maxillary and mandibular dentures instead. The dentures were fully covered with dental plaque, calculus and food debris. The lower border of her chin was painful on palpation and the skin in this region was hyperemic. The mandibular denture seemed firmly "stuck" on the alveolar ridge. After careful removal of the dentures, a mesostructure on a transmandibular implant according to Bosker became visible. The mesostructure was like the overdenture fully covered by dental plaque and calculus (Fig. 2A). The peri-implant tissues were painful and severely inflamed. The posts of the transmandibular implant were surrounded by deep pockets. Radiographic examination revealed extensive bone loss at 2 of the 4 transosseous posts (Fig. 2B). The transmandibular implant was removed under general anesthesia. Healing was uneventful. A new conventional denture was made, but not worn by the patient due to very poor retention. (This case has been previously published in *Gerodontology* 2011<sup>13</sup> and was reprinted here with permission of the publisher/editor of *Gerodontology*.)

Fig. 3 An 78 year-old men with a transmandibular implant according to Small (Staple Bone).

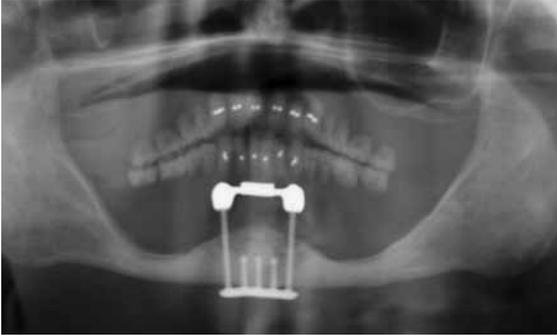


Fig. 3A Orthopantomogram made at the recall visit two years after patient had been lost to follow up.



Fig. 3B The posts are covered with plaque. The screw shape of the post makes proper cleaning very difficult.



### Case 3

A 78 years-old fragile, demented male patient had been provided with a transmandibular implant according to Small many years ago when he was not suffering from dementia. With the help of his wife and a home care organization the patient continued to live in his own home. The family dentist recalled the patient for a routine checkup as he noticed that the patient had not visited him for more than 2 years. When the patient showed up in the practice, the dentist noted a layer of dental plaque, calculus, gingivitis and increased probing depth around the posts. Radiographic examination revealed peri-implant bone loss (**Fig. 3A**). The dentist cleaned the bar suprastructure and asked the family to bring in the patient for regular oral health care in order to prevent progression of the peri-implant bone loss and to reduce the peri-implant inflammation. As the patient again did not show up at his scheduled recalls, the dentist himself actively organized transportation of the patient to his dental office, one year after the last visit. At that visit, it became obvious that the oral hygiene had even become worse (**Fig. 3B**) and the peri-implant bone loss had progressed. Unless the level of oral hygiene and the frequency of professional aftercare can be improved, the bone loss will continue rapidly and the transmandibular implant has to be removed with a significant risk on peroperative or subsequent fracture of the mandible.

## Discussion

Frail elderly with transmandibular implants who are not able to keep their oral hygiene at a certain desired level and in whom the caregivers do not provide the needed level of oral care are at risk for developing severe complications as described above. These complications include pain and the risk on fracture of the mandible as well as the general health hazard resulting from the continuous inflammatory stimulus arising from the severe peri-implantitis.<sup>14-17</sup> So, in case fragile patients become home bound or are admitted at nursery homes, both dentists as well as health care workers should be aware that there might be an implant system in the patients' mouth that is in need of very thorough oral hygiene maintenance.

In contrast to an implant-supported overdenture on endosseous implants, particularly the implant-supported overdenture on a transmandibular implant system is at high risk of significant complications. Considering implant-supported mandibular overdentures on endosseous dental implants, Meijer<sup>18</sup> revealed that even after close surveillance, the incidence of peri-mucositis and peri-implantitis is approximately 60% and 30%, respectively. Daubert<sup>19</sup> reported similar figures. While in cases of endosseous implants the consequences of peri-implant problems are usually rather mild and localized, in cases with a less thorough oral hygiene maintenance, such a neglect of oral hygiene maintenance might have significant consequences for patients supplied with a transmandibular implant. In such patients, the peri-implant bone loss is developing rapidly and might end with a fractured mandible. Spontaneous fractures of an extremely resorbed mandible hardly occur if any. There is always a need of an external factor to cause fracture of a severely resorbed mandible, often a traumatic injury. Severe peri-implantitis resulting in weakness of a severely resorbed mandible might be such a factor as well as (extra) bone loss related to removal of an implant in an already compromised mandible.<sup>12</sup>

Referring to the previous paragraph, we like to pose that care dependent frail elderly provided with transmandibular implant systems are in need of frequent professional implant aftercare and thorough oral health maintenance as not complying to such a regime frail elderly will be posed to a significant oral (and general) health problem. The patients' dentist, general physician and/or medical staff of the nursing home should foresee the problems that easily can arise in patients supplied with a transmandibular implant system when a patient becomes homebound or has been admitted to a nursing home. Together the dental and medical workers are responsible for arranging the needed level oral care in these patients to prevent transmandibular implant system related problems.

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## Chapter 6.2

# Oral implants in dependent elderly people: blessing or burden?

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Anita Visser, Cees de Baat, Arie Hoeksema and Arjan Vissink. Oral implants in dependent elderly persons: blessing or burden? Gerodontology 2011; 28:76-80.*

## Abstract

Care dependent patients may experience problems with their conventional dentures, which can be resolved by treatment with an implant-supported denture. Furthermore, patients treated with an implant-supported denture previously, may have become dependent, being no longer in the position to maintain a proper level of oral self-care. These conditions are demanding an individual approach. In the decision-making process, the dentist has to consider 6 issues. The issues are the benefits and effectiveness of any treatment, the individual oral health care programme, the cooperative abilities of the patient, the availability of voluntary and/or professional care providers, and the accessibility of good and quick professional oral health care service. Depending on the outcome of this consideration, the treatment may be either removal of the superstructure and 'burying' the implants, improving an existing implant-supported denture or inserting implants and fabricating a new implant-supported denture.

## Introduction

Since the eighties of the previous century, endosseous oral implants are used to retain mandibular overdentures. The treatment concept has been widely accepted and even evolved to first-choice treatment for edentulous patients with retention problems related to their conventional mandibular denture.<sup>1</sup> Moreover, the indication for insertion of oral implants to retain mandibular overdentures is not age-restricted.<sup>2,3</sup> Because of the current high overall oral implant success, i.e., many studies demonstrating high implant survival rates, a relatively low need for care and aftercare, high patient satisfaction scores, and improved quality of patients' lives. Oral implant treatment has shown to be a good option at all ages.<sup>2,3,4,5,6</sup> Consequently, implant-supported prosthetic rehabilitation of functional and aesthetic oral problems is indicated more frequently. Although implant-supported (partial) dentures have shown very favorable results in independent subjects able to perform the required level of oral self care, there may raise problems in patients who have become dependent on others for daily oral health care. Conversely, selected care dependent patients with retention problems of their conventional denture may be helped with fabrication of an implant-supported overdenture.

Health care needs might occur at any age, but the proportion of patients needing voluntary or professional oral health care (nurses, executive care providers, volunteer aids, dental hygienists, dentists) is increasing with age.<sup>7</sup> Unfortunately, specific oral health care is not available for every patient with an implant-supported overdenture who needs this kind of care. Additionally, in many cases, the volunteer aids or professional general care providers are not educated and practiced in providing specific oral health care needed.<sup>8</sup> Thus, dental hygienists and general dental practitioners, as well as executive care providers, volunteer aids and even health care insurance companies, should anticipate the growing demand of specific oral health care for an increasing number of patients provided with implant-supported overdentures. In this paper, 3 cases are described of dependent patients needing care and aftercare for implant-supported overdentures outreaching the standard oral health care and aftercare. The required care and aftercare are described and suggestions are presented to resolve implant-related oral problems.

### Case 1

A 86-years-old woman with dementia syndrome was residing in a nursing home since 3 weeks. She was bedridden and slept nearly the entire day. The patient was edentulous and not wearing her dentures. She seemed to suffer from oral pain while eating. Unfortunately, she could not respond the executive care providers' questions regarding the pain adequately. The executive care providers examined the woman's mouth, but did not observe abnormalities as possible causes of the patient's pain experienced. Thereupon, the executive care providers requested the nursing home dentist to examine the patient. Contrary to the executive care providers, the dentist raised the patient's rigid tightened lower lip. In the cuspid region of the mandible, two ball attachments on oral implants were seen puncturing the inner side of the lower lip. The ball attachments were covered by plaque and calculus. The peri-implant tissues showed inflammation. Because the patient had not worn her conventional maxillary denture and implant-supported mandibular overdenture for several weeks, the lower lip was strongly impressed and painfully injured by the ball attachments (Fig. 1). As a result, the patient could not move her lower lip without restraint while eating. The executive care providers were surprised by this finding as none of them had noticed the 2 oral implants with ball attachments; neither had they recognized the not-worn mandibular denture as an overdenture. Even more strikingly, some executive care providers were not familiar with oral implants at all. Shamefully, the daily oral health care provided had been inadequate essentially. Further intra-oral examination revealed ill-fitting conventional maxillary and implant-supported mandibular dentures.



Fig.1 Lower lip, strongly impressed and painful injured by ball attachments.

Two treatment options were considered, viz. (1) adjustment of the mandibular and possibly the maxillary denture and encouraging the patient to wear her denture(s) again, at least preventing the ball attachments from injuring the lower lip again, (2) removing the ball attachments and placement of cover screws in the implants in order to "put the implants to sleep". Moreover, as the patient was suffering from severe dementia syndrome, could hardly eat, did not interact, and was bedridden

nearly the entire day, treatment option 2 seemed the appropriate option for this patient. The nearest family members, the nursing home physician, and the executive care providers were informed on the two treatment options and requested to give their opinions. All persons involved, agreed to treatment option 2.

One week after removal of the ball attachments, reviving the tissue that had been in direct contact with the ball attachments and placement of the cover screws, an oral examination was carried out. The mucosal tissues had overgrown the implants spontaneously and had healed uneventful. The patient was not suffering from pain any longer and nourishing food had improved. There was no need or demand to fabricate new conventional dentures.

### Case 2

A 50-years-old edentulous man had experienced a stroke two years previously and left-sided hemiplegia. As a consequence, he was dependent on an electric wheel chair. He could not speak. Due to the combination of partial left hemi-facial paresis and severe atrophy of the mandibular residual alveolar ridge (Cawood Class VI), his mandibular complete denture showed severe retention problems and could hardly be kept in place. Frequently, the denture was observed as hanging out of his mouth. His family members and the executive care providers consulted the nursing home dentist. In the decision making process, it was an important data that the family members were very closely concerned with the patient. They visited him daily and participated in his daily care.

Because of the good support which was expected from the volunteer aids, the nursing home dentist proposed treatment with a mandibular overdenture supported by two oral implants with a ball attachment mesostructure. Ball attachments were preferred rather than a bar-clips mesostructure because of easier oral hygiene maintenance by the volunteer aids and executive care providers. The benefits and disadvantages of this treatment were discussed with the patient, his family members, the nursing home physician, and the executive care providers. All agreed on the treatment proposed. The endosseous implants were inserted under local anesthesia at the Oral and Maxillofacial Surgery Department of a nearby University Medical Centre. Three months later, the nursing home dentist placed the mesostructure and fabricated the overdenture. Both the volunteer aids and the executive care providers received oral health care instructions from the dentist. The dentist made 3-months recall appointments to examine the oral health and to carry out necessary treatments (e.g., calculus removal, denture repairs, etc). In addition to the routine daily oral health care, the patient needed some assistance from volunteer aids or executive care providers while inserting and removing the denture. Although the implant-supported denture made the patient more dependent for personal care, the gain of oral function and aesthetics outweighed the inconveniency largely.

Fig. 2 Transmandibular implant.



Fig. 2A Mesostructure covered by plaque and calculus.



Fig. 2B Swollen, inflamed peri-implant mucosa after removing the mesostructure.

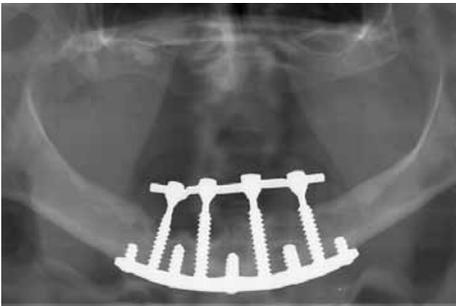


Fig. 2C Panoramic radiograph showing extensive bone loss around 2 of the 4 transosseous posts.

### Case 3

An 85-year-old woman with dementia syndrome had recently been admitted to a nursing home and was complaining of pain, interpreted by the executive care providers as a toothache. The lower border of her chin was painful on palpation. The chin skin was hyperemic. Due to the pain, tooth brushing had been impossible during the past two weeks, neither by the patient nor by the executive care providers. Fortunately, she could speak clearly and was able to respond to questions adequately. She had been visiting her family dentist regularly before admittance to the nursing home. Because of the supposed toothache, the executive care providers requested the nursing home dentist to examine the patient.

From what the executive care providers had told him, the dentist expected to observe natural teeth during intra-oral examination. However, he found complete maxillary and mandibular dentures. The dentures were covered by plaque and accumulated food particles and the mandibular denture seemed "stuck" on the alveolar ridge. The dentist removed the mandibular denture carefully. The denture appeared to be an overdenture supported by a transmandibular implant. The mesostructure was covered by plaque and calculus (Fig. 2A). While examining the mouth, the peri-implant tissues appeared to be painful and showed inflammation (Fig. 2B). After removing the suprastructure, the transosseous posts of the transmandibular implant appeared to be mobile. Radiographic examination revealed extensive bone loss at 2 of the 4 transosseous posts' interfaces (Fig. 2C).

The nearest family members, the nursing home physician, and the executive care providers were informed on the problem. Treatment proposed was surgical removal of the transmandibular implant under general anesthesia. All persons involved, agreed to the proposal. A feasible risk of general anesthesia is aggravating the dementia syndrome. This risk was accepted as the patient's oral pain, discomfort, and distress outweighed the risk. After surgical removal of the transmandibular implant under general anesthesia and wound healing, re-implantation with endosseous implants was considered shortly and meticulously. The persons involved decided unanimously to fabricate conventional complete dentures. Reason for the decision was an accumulation of circumstances which compelled to provide relatively restraint oral health care: the patient's history of inadequate oral self care, the patient's limited ability of cooperation, and the executive care providers' and volunteer aids' limitations to be of assistance to the patient in achieving and maintaining an adequate level of oral health care. Meanwhile, conventional maxillary and mandibular dentures have been fabricated and the patient's oral function is satisfactory.

## Discussion

Implant treatment in elderly persons has revealed results comparable to those observed in younger persons.<sup>3</sup> However; in elderly persons more adaptation and post-insertion problems were observed. Amongst others, elderly persons more often experienced cleansing problems of the superstructure, inflammation of the peri-implant tissues, and tongue, lip, and cheek biting. Furthermore, Jemt<sup>9</sup> showed that in his research project about 10% of the elderly patients experienced obvious problems with adaptation and muscle control, problems which were not observed in younger patients. Thus, implant insertion in dependent elderly persons needs a careful consideration of the advantages and disadvantages. Joint consultation of the dentist with the patient, his or her family or representatives, the executive care providers and the nursing home physician is a central theme. Of course, this is not limited to elderly persons, but to everybody who is dependent with regard to maintaining proper oral health. Consequently, some questions should be raised when considering a treatment by implant-supported overdentures:

1. *Is the proposed treatment useful in contributing the patient's well-being and quality of life?*<sup>10</sup>
2. *Can insertion of dental implants and fabrication of an implant-supported overdenture be considered the best suitable treatment?*  
It should be considered if there is no alternative treatment which is supposed to provide a similar result with less morbidity. E.g., the question should be raised if the problem also could be resolved adequately with a conventional prosthodontic treatment needing reduced specific oral health care.
3. *Does a treatment with an implant-supported overdenture fit integrally in the patient's individual oral health care treatment plan which has been formulated to ensure an adequate oral health care level, prophylaxis, support and after-care for life?*<sup>11</sup>
4. *Is the patient sufficiently cooperative to undergo the surgical and prosthetic treatment and aftercare?*  
Generally, inserting implants in a non cooperative patient is not the main problem, especially when a non-cooperative patient can be treated under general anesthesia. However, fabricating an implant-supported overdenture and the specific oral health care needed for life are uncertain issues. Without any cooperation of the patient, both the prosthodontic treatment and the aftercare needed can not be carried out successfully, making inserting implants useless.
5. *Is the patient supported by a well-functioning network of volunteer aids (e.g. relatives) and/or professional care providers who can be of assistance in oral health (self) care?*

At the beginning of the 21<sup>st</sup> century, the Dutch government reduced the budget of providing health care for dependent persons substantially as an economy measure. As a consequence, fewer hands are available for the daily care of the patients. The physicians and care providers have to perform more work in less hours, while conversely, due to the ageing of the population, more hands will be needed! In some institutions, the quality of care provided is already a threat for the patients' quality of life. Particularly, the lower care budget has repercussions for providing adequate oral health care in institutions, as this care does not have priority from nursing home physicians and executive care providers. As such, adequate oral health care needs attention of the volunteer aids.

6. *Is it possible for the patient to see an oral health care professional regularly and is oral health care easily accessible in cases of emergency?*

Before deciding to insert implants, the patient and all persons concerned should be informed about the specific oral health care needed for life. Without adequate daily oral health care by volunteer aids and executive care providers, the oral health care professionals can not keep the oral health of the patient at the level required. Consequently, the maintenance of the oral implants and the superstructure is at risk.

## Epilogue

Dependent elderly (and younger) persons suffering from retention problems of their conventional mandibular denture can benefit from insertion of oral implants, providing that adequate oral health care and aftercare can be delivered by volunteer aids and executive care providers (case 3), while in dependent persons provided with an implant-supported overdenture no more able to wear any denture, removal of the anchorage structure is easily performed by "putting the implants to sleep" (case 1). The latter is also the proper approach in the unfortunate event that a proper level of oral health care can not be maintained or that the general health condition of the patient does not allow intensive daily oral health care. Fortunately, the transmandibular implant (case 2) is currently no longer used since infection can not well controlled and removal of implants leads to invasive procedures when compared to 2 to 4 endosseous implants. However, one still might encounter care dependent patients in nursery homes provided with a transmandibular implant in the past.

As the number of persons provided with implant-supported prosthodontics is rapidly increasing, we advocate providing all patients who had been implanted with an "implant passport" to provide future healthcare workers with adequate information about the implant-system used for that particular patient. In addition, regular information and instructions of nursing staff and family members about the oral condition of the patient are essential for a good maintenance of this oral health condition.

Furthermore, before introducing intensive daily oral health care as a standard in care institutions, e.g., nursing homes, the knowledge and skills on oral health care of physicians and executive care providers in charge should be improved. They should be able to recognize oral problems and to consult oral health care professionals whenever needed. It has to be noted that similar care and aftercare problems may occur in patients with a minimal residual dentition (e.g., two canine teeth) provided with retention devices (root copings with precision attachments, telescope crowns etc).

Finally, attention should be paid to factors related and associated with oral and general health. Considering the ageing of the population and the related increase in number of medically-compromised patients, the risks of oral infections with repercussions on general health are increasing.<sup>12</sup> For instance; peri-implantitis could be a risk for general health.<sup>13,14</sup>

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