Utilizing laser therapy to manage oral potentially malignant disorders in older adults at the primary care level

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Abstract

Oral lesions are a significant concern among older adults because they can progress to oral cancer if not diagnosed and treated promptly and effectively. Transportation to the hospital is a major barrier to oral healthcare for many older adults. The purpose of this editorial is to address the challenges of managing oral potentially malignant disorders in the older population, highlighting the barriers they face in accessing healthcare services, the potential use of laser therapy for management, and the direction of research in this area. Due to the limited access of the older to healthcare services, primary healthcare facilities within communities serve as their primary providers. Laser therapy is recommended for the management of oral potentially malignant disorders due to its favorable outcomes. This approach has been tested in several primary healthcare centers in Thailand. In our project, laser therapy was used to treat oral potentially malignant disorders in primary and secondary healthcare services. This includes photodynamic therapy for older patients with extensive lesions, as well as individuals with oral leukoplakia and erythroplakia who have declined curative surgery. It has also been used in cases of recalcitrant lichen planus to steroid or photobiomodulation therapy. This approach has been well accepted by both oral healthcare providers and patients. To expand access to these treatment options in such settings, it is critical to empower healthcare professionals, particularly dentists and dental nurses, to integrate laser techniques into geriatric care and oral cancer screening. Establishing a network foundation for orofacial laserology would also enhance the potential of such settings.

Key words: primary care, laser therapy, oral cancer, cancer prevention, older

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Introduction

The increasing proportion of the aging population globally has had a substantial impact on healthcare due to their compromised physical, mental and functional wellbeing. An observational study revealed a bidirectional association between weight loss and mental health in older adults, persisting even after 3 months of observation.[1] A recent systematic map of the systematic review included 39 articles indicating that the decline in oral function is primarily attributed to the frailty of older individuals. This review pointed out specific areas such as caries, periodontal disease, orofacial pain and temporomandibular disorders, mucosal lesions, dry mouth, and oral motor function as crucial gaps of knowledge for diagnosing, preventing, assessing risks, and treating non-operative or operative procedures. Among these domains, there was a significant gap in knowledge when it came to treating oral mucosal lesions in older people. Halitosis was also identified as an area where dentists need to improve their communication skills and knowledge of treatment due to its complex nature. A systematic review demonstrates that laser therapy and photodynamic therapy are effective treatments for this condition.[2,3] This issue requires a multidisciplinary approach from healthcare professionals.[4] In addition, a cross-sectional survey of 300 dentists working in private practice, dental clinics and universities found that 85% had difficulty diagnosing oral lesions.[5] Insufficient knowledge in managing oral mucosal lesions was also compounded by the discovery that potentially malignant disorders in the oral cavity were observed in 4.47% of the global population, 10.54% in Asia and 3.07% in Europe. These disorders exhibited unpredictable rates of progression to severe epithelial dysplasia and oral squamous cell carcinoma.[6]

The multicenter study involving 76,045 biopsy records from 7 centers in Asia and North America, with 11,346 older adults participating, revealed a 14.93% prevalence of geriatric oral lesions. The majority of these lesions were categorized as reactive or inflammatory oral lesions (46.58%), followed by malignant tumors, mostly squamous cell carcinoma (15.71%), odontogenic cysts (8.87%), benign tumors (7.41%), allergic or immunological disorders (6.65%), oral potentially malignant disorders (6.27%), and other categories (5.22%). Infections were the least prevalent at 3.18%. The study indicated the critical need for systematic screening for oral potentially malignant disoders and oral malignancy in the older population to enable early detection and intervention.[7] Similarly, a study of oral cancer screening programs conducted by general dentists in the USA highlighted the significance of screening for oral potentially malignant disoders. Skipping an oral cancer screening program can result in severe health, financial and social consequences for individuals and society as a whole. For instance, the disease may be more advanced, leading to limited or less effective treatment options, increased health risks and the need for complex and costly procedures.[8] The provided information emphasizes the crucial need for developing innovative treatments for oral potentially malignant disorders or epithelial dysplasia.

In addition to the challenges associated with maintaining fragile general and oral health, the socioeconomic status of older adults can serve as a significant barrier to accessing advanced treatments. Consequently, it is essential to select a suitable model for managing oral potentially malignant disorders and preventing oral cancer that is customized to a specific population. This selection should consider factors such as disease incidence, available resources and the healthcare system of the respective country.[9] In many Asian countries, the older in remote areas depend on primary healthcare systems. Therefore, the development of accessible and user-friendly healthcare technology for primary care workers is a valuable endeavor.

Objectives

This editorial aims to highlight the challenges of treating the older population, focusing on oral lesions, the barriers older adults face in accessing healthcare services, the critical role of primary care, and the potential use of laser therapy for managing oral potentially malignant disorders. Furthermore, we present our project, which is supported by the National Science Research and Innovation Fund (NSRF) in Thailand. This project concerns the development of laser therapy for the treatment of oral potentially malignant disorders in primary and secondary healthcare services. Additionally, we explore future research directions in these areas, emphasizing the need for multidisciplinary approaches.

The challenges of treating oral lesions in older population

The diagnosis of oral lesions often necessitates histopathological investigation through biopsy. Older individuals may exhibit reduced capacity to tolerate surgical procedures, including minor oral surgeries. A study of 23,217 newly diagnosed oral cancer patients revealed that, besides medical conditions such as poor general health, low body mass index (BMI) and advanced tumor stage, aging was found to be one of the significant reasons for not undergoing curative surgical treatment.[10] In our project on the development of laser therapy for treating oral potentially malignant disorders in primary and secondary healthcare services, we found that older people tended to refuse surgical treatment, including incisional biopsy under local anesthesia. This was mainly due to their inability to tolerate pain and bleeding during and after the surgery. According to a systematic review, there is strong evidence that frailty in older and oldest patients undergoing major surgery predicts postoperative mortality, complications and prolonged hospital stay.[11]

Using medication such as topical steroids to treat oral lesions in older adults without a definite diagnosis from a biopsy may only be effective for treating certain lesions, such as oral lichen planus. However, oral candidiasis, bad taste, nausea, dry mouth, sore throat, and swollen mouth were commonly found in older people after taking topical steroids.[12,13] The aforementioned side effects affect the oral health of older individuals.

Based on a recent systematic review, non-invasive methods for diagnosing oral potentially malignant disorders are in the developing phase, with histological investigation via surgical biopsy being the only method to obtain a definite diagnosis.[14] There was also a strong relationship between oral epithelial dysplasia and the malignant transformation of oral potentially malignant disorders. Therefore, the difficulty of undergoing surgery due to general health or attitude limits the effectiveness of oral cancer screening, prevention and treatment in the older individuals. Surgical techniques that are minimally invasive and cause fewer postoperative complications are highly beneficial for the management of oral potentially malignant disorders and the prevention of oral cancer in older individuals.

The barriers of older adults to accessing healthcare services and the critical role of primary care

The review of global access to oral care revealed that older individuals encounter challenges in receiving proper oral health treatment due to limitations in transportation. Consequently, this has led to an increase in the severity of oral disorders such as periodontal disease resulting in tooth loss and oral potentially malignant disorders transforming into oral cancer.[15]

To illustrate the local situation, we may consider the case of Thailand which is currently facing a growing concern with its aging population, as almost 20% of its 68.2 million inhabitants are older people.[16] This demographic shift increases the risk of chronic diseases among the aging population. To address this issue, sub-district health-promoting hospitals, which serve as the primary care units closest to the people, are providing comprehensive health services that encompass health promotion, disease prevention, medical treatment, and rehabilitative care, all aimed at ensuring continuous and accessible care for older adults.

A significant portion of Thailand's older population, 65.7%, lives in rural areas, with 12% living alone.[16] Many of these individuals need caregivers to help with daily activities. Access to oral care remains a major barrier to dental treatment for older adults. The most recent survey in Thailand indicates that 66.2% of older adults have not utilized dental services. Among those residing in rural areas, 32.2% received dental treatment at the primary healthcare level.[17] The lack of a caregiver to accompany them to the community hospital is a significant barrier to accessing dental services.

While dental treatment for older adults in Thailand is covered by national health insurance, additional costs, such as caregiver fees or transportation expenses, pose further challenges. The common oral disorders in the older people have been dental caries and periodontal disease, 60.0% had untreated dental decay teeth, and 48.7% had periodontal diseases.[17] The potentially malignant disorder has gradually increased in this group of people as a global situation.

To overcome this barrier, primary healthcare is considered necessary in ensuring access to overall wellbeing care, including oral care, for older people. The establishment of a robust primary care system in Thailand since 1970 has enabled the entire country to achieve universal healthcare coverage with efficiency and equity.[18] It is clear that primary healthcare can encompass not only health promotion but also disease prevention and control. Therefore, it is essential to introduce advanced technology and telehealth services to primary care providers. This will undoubtedly benefit the community and improve the overall health of older people who lack opportunities to seek healthcare services.

The significance of primary care was globally further emphasized during the COVID-19 pandemic, as the effectiveness of primary care and the community played a crucial role in stopping the outbreak of the disease.[19]

Using laser therapy for managing oral potentially malignant disorders

According to review articles published from 2011 to 2021,[20–22] the understanding and explanation of the etiology of oral potentially malignant disorders is influenced by multifactorial factors and genetic instability of keratinocytes, primarily due to oral mucosa inflammation. The progression of oral disorders to oral cancer exhibits varying temporal patterns based on the types of oral potentially malignant disorder involved. For instance, oral lichen planus presents a lower risk of progression to oral cancer than erythroplakia. Notably, the increased risk of progression is closely linked to oral epithelial dysplasia, necessitating conventional histopathological scrutiny via tissue biopsy.

Laser therapy can be used for a wide range of applications in managing oral potentially malignant disorders, including laser surgical biopsy, reduction of oral mucosa inflammation, promotion of healing, and treatment of oral squamous cell carcinoma in situ. Using high-intensity laser therapy for surgically managing oral potentially malignant disorders has been continuously reported. The conventional CO_2 laser, neodymium-doped yttrium aluminium

garnet (Nd:YAG) laser, potassium titanyl phosphate (KTP) laser, or the newer 445 diode laser demonstrated positive clinical results in terms of hemostasis control, less postoperative pain and short-term remission of the lesions.[23–25] It should be noted, however, that the recurrence and progression rates, especially in the case of oral epithelial dysplasia, were not lower than with other conventional procedures, especially when the laser was used in the vaporization technique. The authors highly recommend utilizing the excisional technique of laser surgery for oral epithelial dysplasia. In our project of treating oral potentially malignant disorders in primary and secondary healthcare services, we found that the older individuals tolerated well the use of laser for incisional and excisional biopsies under local anesthesia of lesions in which the size was smaller than 2 cm^2. The specimens were fully processed for histopathological investigation.

A recent systematic review of 26 clinical trials[26] and a recent clinical trial[27] demonstrated that photodynamic therapy, a non-thermal effect of laser therapy that generates reactive oxygen species (ROS), was an effective treatment in achieving complete-to-partial remission in the majority of oral lesions. This suggests that photodynamic therapy could be a promising treatment for oral potentially malignant disorders with epithelial dysplasia, and even early invasive squamous cell carcinoma. In our project of treating oral potentially malignant disorders in primary and secondary healthcare services, we used photodynamic therapy for the older patients with extensive lesions, as well as for individuals with oral leukoplakia and erythroplakia who declined curative surgery, and for cases of lichen planus that did not respond to steroid or photobiomodulation therapy. A systematic review revealed that photodynamic therapy is an effective treatment for oral lichen planus, offering the same efficacy as steroid use.[28]

According to systematic reviews, low-intensity photobiomodulation therapy provides effective results without side effects compared with steroids in patients with oral lichen planus.[13,29] This treatment is suitable for older patients with lesions that do not respond to steroid treatment or who experience side effects such as candidiasis.

Research direction and application of using laser therapy for managing oral potentially malignant disorders in primary care for older people

Minimally invasive laser surgery for oral lesions allows the older adults to have an incisional biopsy for an accurate diagnosis. Photodynamic and photobiomodulation therapies are noninvasive alternatives for older individuals who cannot take local or systemic steroids due to the risk of candidiasis. Photodynamic therapy appears to be "surgery without cutting" to maintain or control the lesions with oral epithelial dysplasia in the older individuals who are not able to undertake curative surgery.

The use of these therapies in older adults requires multiple treatment sessions. If these treatment options could be offered in primary care settings, the older patients would benefit directly. Our research on introducing laser therapy into primary care showed that the local healthcare personnel needed the proper laser machine to use in addition to the knowledge of how to apply laser therapy to the patients.[30] We found that the fulfillment of knowledge and proper laser equipment provided equivalent clinical efficacy with laser therapy in the older individuals across all levels of oral healthcare.[31] Therefore, research in this area focuses on developing user-friendly and precise techniques and specific laser machines to achieve this goal. Additionally, the preparation of photosensitizers for photodynamic therapy with ready-to-use options is being studied. In order to make these treatments available in primary care settings, healthcare professionals, especially dentists and dental nurses, need to be provided with knowledge of integrated laser techniques for geriatric care and oral cancer screening. A network foundation for orofacial laserology should also be established to provide further care for older adults.

Limitations

The operative definition of primary healthcare depends on the public healthcare system of an individual country.

Conclusions

The use of laser surgery, photodynamic therapy and photobiomodulation therapy allows for the treatment of oral potentially malignant disorders in older individuals, overcoming the limitations posed by their overall health. The introduction of laser therapy at the primary care level will directly benefit the older population in the control of potentially malignant oral conditions, thereby helping to prevent oral cancer.

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