The effect of jaw exercise on trismus in head and neck cancer patients

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ABSTRACT

Study objectives: Trismus is a symptom that impacts on daily life activities and adversely affects patient health related quality of life (HRQOL). Radiation induced fibrosis is probably one of the most important etiological factors to trismus in head and neck cancer (HNC) patients. The aim of this randomised prospective study was to compare two different jaw exercise devices, regarding improvement in mouth opening (MIO) and patient reported symptoms in HNC patients with trismus.

Methods: The 50 study patients were enrolled in a 10 week structured MIO training programme and randomized to training with either TheraBite® device or Engström jaw device. The patients were regularly assessed by an oral surgeon and answered different questionnaires i.e. EORTC QLQ-HN35 and the Gothenburg Trismus Questionnaire (GTQ).

Results: Both groups improved their MIO, 7.2 mm (22.9%) and 5.5 mm (17.6%) for TheraBite® and Engström respectively. The largest increase in MIO was seen during the first 4 weeks of exercise. After the exercise period 84% in the TheraBite® group (n=21) and 60% in the Engström group (n=15) no longer fulfilled the trismus criteria. A statistically significant improvement regarding trismus related symptoms in both groups with less pain, jaw related problems and eating limitations after the exercise period was found (p<0.05 and p<0.01).

Conclusion: Structured intervention with a jaw exercise device effectively improved mouth opening capacity and pain-related and less trismus related symptoms in HNC patients. No statistically significant differences between the different devices were found. We suggest a feasible exercise program for radiation-induced trismus in HNC patients.

INTRODUCTION

Reduced ability to open the mouth (trismus) is a common symptom in head and neck cancer (HNC) patients with an incidence of 38% (1). Trismus affects many aspects of daily life such as eating, chewing, swallowing, dental hygiene and impairs necessary dental or surgical management. As a consequence, trismus can lead to malnutrition and weight loss. Patients with trismus and HNC also report pain, depressive symptoms and an overall impaired health related quality of life (HRQOL) (1). The most common approach to treat trismus is stretching of the muscles of the jaws, with or without assistance from a jaw exercise device.

Primary aim of this randomized prospective study was to compare two different jaw exercise devices, according to measured improvement in mouth opening and patient reported symptoms in HNC patients with trismus. A secondary aim was to investigate the compliance to exercise.

RESULTS

No statistical differences were found between the groups regarding age, gender, treatment regimen, tumor location, stage or comorbidity.

Both groups improved their MIO, 7.2 mm (22.9%) and 5.5 mm (17.6%) for TheraBite® (T) and Engström (E) respectively. The largest increase in MIO was seen during the first 4 weeks of exercise. After the exercise period 94% in the T group (n=21) and 60% in the E group (n=15) no longer fulfilled the trismus criteria.

Four patients in the T group and 3 patients in the E group reported to have exercised only sporadically. The patients who exercised only sporadically had lower mean MIO both before start of exercise and at the follow-up occasion. Mean exercise frequency was 2.7 and 2.6 times per day for T and E respectively, during the first 4 weeks of exercise. During week 5-10 there was a decrease in exercise frequency in the T group; 1.9 times/day, compared to the group using the E device that still exercised 2.6 times/day. Notable was that the T group had higher MIO at the 4-week follow-up, and continued to have so also at later follow-up, in spite of a lower exercise frequency in this group.

We found no statistically significant differences in mean GTQ-score between the groups before or after the exercise program. However, both groups statistically improved in mean GTQ scores in all three domains (Jaw related problems, Eating Limitations and Muscular tension) at the 3 month follow-up compared to before exercise.

We found no statistically significant differences in mean EORTC QLQ-HN35 score between the groups before or after the exercise program.

CONCLUSIONS

In this randomized prospective study we found that structured intervention with a jaw exercise device effectively improved mouth opening capacity, lead to pain-relief and less trismus related symptoms in HNC patients with trismus following radiation therapy. Compliance to exercise was comparable in both groups and was highest during the first four weeks of exercise. We could not detect any relevant differences in symptoms and mouth opening results between the two different jaw exercise devices used in this study. Selection of which jaw device to use should be made individually, based on factors such as dental health and individual preferences. We suggest a feasible exercise program for radiation-induced trismus in HNC patients. Studies on long-term results of exercise and trismus are warranted.

METHODS AND MATERIALS

50 patients with HNC living in the Gothenburg area who developed trismus after HNC treatment were randomized to an exercise intervention program with either the TheraBite® device (T) or the Engström’s wooden blades jaw device (E). Tumororcalization in each group were poropharynx (n=38), tumor colli (n=6), nasopharynx (n=5) and oral cavity (n=1). The definition of trismus was maximal interincisal opening (MIO) ≤35 mm (2). All patients reported HRQOL via validated Patient Report Outcomes (PRO) questionnaires including Gothenburg Trismus Questionnaire (GTQ) (3) and the European Organisation for Research and Treatment of Cancer Quality of Life (EORTC QLQ) Head and Neck module H&N35.

The exercise program consisted of a 10-week structured exercise program with active and passive stretching exercises 5 times per day. During the exercise program the patients were evaluated by an oral surgeon with measurement of MIO after 4 and 10 weeks and in addition 3 months after start of intervention. All patients were instructed to fill out an exercise diary with a profiled weekly schedule, also including a space for own comments. Compliance to exercise was assessed by calculating the mean exercise frequency per week for each patient.

DISCUSSION

Structured intervention with a jaw exercise device effectively improved MIO and resulted in less trismus related symptoms. No statistically significant differences in objectively measured MIO or in patient reported symptoms between the two different jaw exercise devices used in this study were found.

We found the largest improvement in MIO during the first 4 weeks of exercise. Results demonstrated that compliance to exercise in this study was 2-3 times per day during the first 4 weeks and then even less frequent the remaining exercise period for both groups.

The fact that the patients in the present study experienced a relatively prompt improvement in MIO could be one explanation why the patients did not exercise as frequently as suggested.

After the intervention the majority of the patients no longer reached the criteria level of trismus i.e. MIO ≤535 mm.

The two different devices were both proved efficient even though the TheraBite® group exercised less frequently during the latter part of the exercise program, maybe indicating that the TheraBite® device is more effective since the MIO in this group still was maintained. Some patients stopped exercising as mouth opening capacity increased and the jaw device couldn’t stretch any further (i.e. the maximal opening of the devices are about 40 mm).

A clinical experience is that the TheraBite® is the device of choice in the case of patients that lack stable incisors, since the design of the TheraBite® with broader mouthpieces distributes the pressure around a larger area of the mandible and maxilla. However, in Sweden the cost of the Engström device is about one 10th of the cost of a TheraBite® device.

We suggest a feasible treatment program for trismus in HNC patients:

- Jaw exercises 3 times per day during at least 4 weeks, then gradual de-escalation of exercise frequency
- Continued exercise 1-2 times per day continuously to maintain mouth opening capacity
- Regular follow-up with measurement of MIO is necessary
- The GTQ (Gothenburg Trismus Questionnaire) can be used as a tool in order to follow-up the patient’s experience of trismus and related symptoms
- Selection of which jaw device to use should be made individually

REFERENCES


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