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科学研究費補助金研究成果報告書

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研究種目：基盤研究（C）
研究期間：2005～2008
課題番号：17500377
研究課題名（和文）摂食・嚥下障害への低周波治療
ー新しい訓練法の開発と内視鏡による効果判定―
研究課題名（英文）Low Frequency Treatment for Dysphagia
― The Development of A New Treatment method and the Videoendoscopic Investigation―

研究代表者
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研究成果の概要：
口腔期の摂食・嚥下障害で、口腔後方への送り込み障害が顕著な症例や、口腔期と咽頭期の連携が不十分な摂食・嚥下障害患者に対して、低周波治療を施行し、嚥下関連器官の動態変化をビデオ内視鏡により観察したところ、低周波通電に従い、舌根部の軽度挙上、喉頭蓋の翻転傾向、披裂軟骨の内転傾向、梨状陥凹の拡大が認められ、嚥下機能の改善が確認された。したがって、摂食・嚥下障害に対する低周波治療の有効性が示唆された。

交付額

（金額単位：円）

	直接経費	間接経費	合　計
2005 年度	900,000	0	900,000
2006 年度	700,000	0	700,000
2007 年度	700,000	210,000	910,000
2008 年度	800,000	240,000	1,040,000
年度			
総　計	3,100,000	450,000	3,550,000

研究分野：総合領域
科研費の分科・細目：人間医工学・リハビリテーション科学・福祉工学
キーワード：医療福祉、リハビリテーション、摂食・嚥下障害、低周波治療、ビデオ内視鏡、嚥下動態

１．研究開始当初の背景

The availability of therapeutic techniques in the rehabilitation of swallowing disorders is limited in the oral and pharyngeal phases of severe dysphagia. Massage-induced relaxation is useful in the treatment of hand and foot muscle dysfunction and may be useful in treating dysphagia. We previously reported that low frequency treatment (LFT) facilitated coordination between lingual muscles and suprahyoid muscles in healthy adults and promoted induction of swallowing in 13th DRS (2004).

２．研究の目的

Using video endoscope, we examined and verified the potential of low frequency stimulation as a treatment for swallowing disorders.

Several therapeutic techniques are used for rehabilitation of dysphagia. Usual methods are massage, relaxation, supraglottic maneuver, the Mendelsohn maneuver and balloon dilation method.

The collaboration of LFT and another technique may be effective for severe dysphasia.

This study investigated whether the swallowing muscles of stroke patients would be influenced by collaboration of LFT and another technique.

３．研究の方法

(1) Low frequency electrodes were mounted on the neck skin between the chin and the thyroid cartilage in a stroke patient with severe oropharyngeal dysphasia. These electrodes mounted in the submandibular position during LFT (Fig1).

Fig.1 Low frequency electrodes

①OG GIKEN PURSECURE PRO KR-7

② Mount of electrodes

A stimulation frequency of 40 Hz was applied, resulting in repetitive contraction of the swallowing muscles.

〔 Low frequency electrical condition 〕

・T-FES mode
（Functional electrical stimulation）
・Electrical stimulus time：10 sec.
・Resting time：5 sec.
・Continuous mode：
・Both sides at same time
・Frequency：40Hz
・Intensity：40Volts

Secondly massage induced relaxation of the anterior neck skin and muscles (Fig.2).

Fig.2 Massage

Movement of swallowing organs induced by LFT or massage was observed by video endoscope. This technique was collaborated once or twice a week in a few months. After training period swallowing movement were investigated by video endoscope.

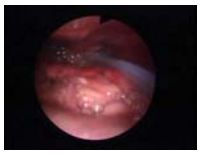
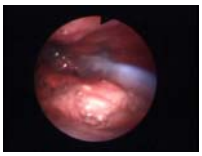
(2) Low frequency electrodes were mounted on the neck skin between the chin and the thyroid cartilage in a brainstem stroke patient with severe cricopharyngeal dysphasia. These electrodes mounted in the submandibular position during LFT (Fig.3).

Fig.3 Mount of electrodes

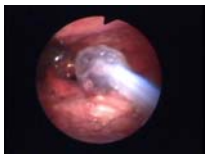
Secondly, balloon dilation method was applied to inadequate opening of upper esophageal sphincter (Fig.4).

Fig.4 Balloon dilation method

①Insertion of catheter ②Balloon dilation

③Avulsion of catheter ④Balloon catheter




Movement of swallowing organs induced by LFT or balloon dilation method was observed by video endoscope. This technique was collaborated once or twice a week in a few months. After training period swallowing movement were investigated by video endoscope.

4．研究成果

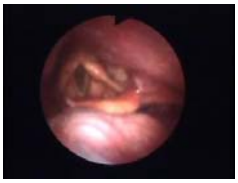
(1)

Electrodes at the submandibular position during LFT induced slight elevation of the tongue base and inversion of the epiglottis, adduction of the arytenoids cartilage, partial closure of the glottis and opening of pyriform sinuses.

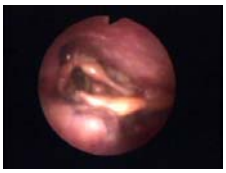
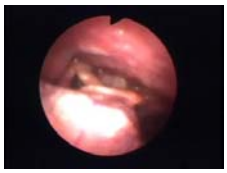
Pharyngeal wall movement was observed at healthy side in a hemi paralytic patient with dysphagia(Fig.5).

Fig.5

① LFT OFF



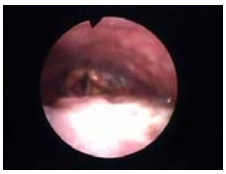
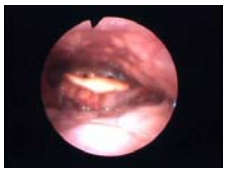
②LFT ON ③LFT ON

Massage could induce slight elevation of the epiglottis and opening of pyriform sinuses could not be observed (Fig.6).

Fig.6

① ②

After training in a few month pharyngeal wall movement of hemi paralytic side and coordination of swallowing organ were observed (Fig.7).

Fig.7 Swallowing after training

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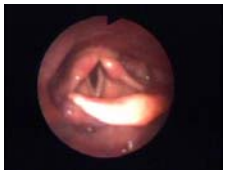
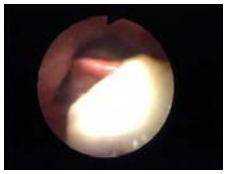

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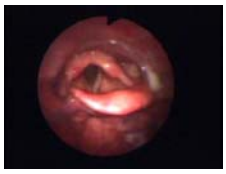


Swallowing muscles repetitively contracted by LFT can elicit the initiation of the swallowing reflex.

The resulting coordination of the swallowing musculature suggests that the collaboration of LFT and massage is effective for severe oropharyngeal dysphagia.

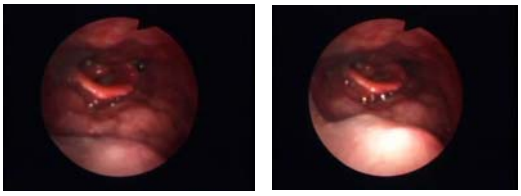
(2)

Electrodes at the submandibular position

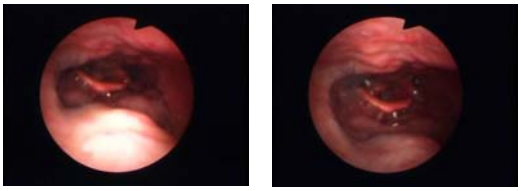
during LFT induced slight elevation of the tongue base and inversion of the epiglottis, adduction of the arytenoids cartilage, partial closure of the glottis and opening of pyriform sinuses. Pharyngeal wall movement was observed. A dilated balloon catheter could be pulled out from upper esophagus relative easily after LFT (Fig.8).

Fig.8 Video endoscopic evaluation during LFT

①LFT OFF ②LFT ON



③LFT ON ④LFT OFF



After training in a few months, pharyngeal wall movement and coordination of swa llowing organ were observed (Fig.9).

Fig.9 Swallow of jelly after training

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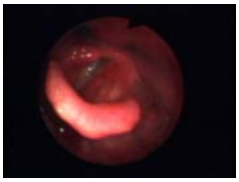

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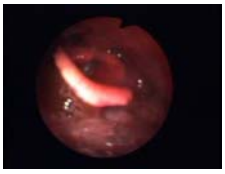

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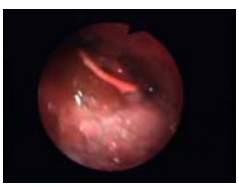

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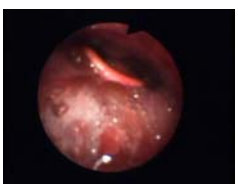

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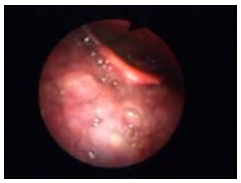

Swallowing muscles repetitively contracted by LFT can elicit the initiation of the swallowing reflex.

The resulting coordination of the swallowing musculature suggests that the collaboration of LFT and balloon method is effective for severe cricopharyngeal dysphagia.

These results suggest that collaboration of LFT and another therapeutic technique is effective for severe oropharyngeal and cricopyaryngeal dysphagia.

５．主な発表論文等

（研究代表者、研究分担者及び連携研究者には下線）

〔雑誌論文〕（計　４件）

①今井信行、大橋　靖、佐藤　厚、佐藤卓也、摂食・嚥下障害患者に対する外舌筋・舌骨上筋群への低周波治療と頚部マッサージを併用する新しい治療法について、新潟医療福祉学会誌、8(1)、26、2008、査読無

②ピラヤ洋子、岩崎テル子、岡村太郎、今井信行、高齢者における機能歯数と心身機能との関係について－介護度、認知機能、食事遂行度との相関より－、作業療法、26、539～546、2007、査読有

③川田洋子、岩崎テル子、岡村太郎、今井信行、高齢者における機能歯数と心身機能との関連について－介護度、認知機能、食事評価との関連より－、新潟医療福祉学会誌、６(1)、22～27、2006、査読有

④安島久雄、高木律男、今井信行、小野和宏、飯田明彦、嵐山貴徳、小児開口障害の２例、小児口腔外科、15(2)、118～124、2005、査読有

〔学会発表〕（計　４件）

①Imai Nobuyuki, Ohashi Y, Sato A, Sato T, Dobashi C, Collaboration of low frequency treatment on suprahyoid muscles and balloon dilation method for severe cricopharyngeal dysphagia, Seventeenth Annual Dysphagia Research Society Meeting, 5-7 March 2009, New Orleans, Louisiana, USA

②今井信行、大橋　靖、佐藤　厚、佐藤卓也、摂食・嚥下障害患者に対する外舌筋・舌骨上筋群への低周波治療と頚部マッサージを併用する新しい治療法について、第８回　新潟医療福祉学会学術集会、2008年10月25日、新潟市

③佐藤　厚、﨑村陽子、今井信行、内山晃子、大橋　靖、前頭葉症状を主要因とする摂食・嚥下障害へのアプローチ、第14回日本摂食・嚥下リハビリテーション学会学術大会、2008年9月13-14日、千葉市

④Imai Nobuyuki, Ohashi Y, Collaboration of low frequency treatment and massage on suprahyoid muscles for severe oropharyngeal dysphagia, Sixteenth Annual Dysphagia Research Society Meeting, 6-8 March 2008 Isle of Palm, South Carolina, USA

〔図書〕（計　０件）

〔産業財産権〕

○出願状況（計　０件）

○取得状況（計　０件）

〔その他〕

６．研究組織

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