

# Effect of sarcopenia in masticatory and swallowing muscles on oropharyngeal dysphagia in patients with acute stroke



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## Introduction

Sarcopenia is a syndrome characterized by decline of both skeletal muscle mass and strength. Recently, sarcopenia is considered to one of the factors of oropharyngeal dysphagia (OD). In addition, systemic skeletal muscle atrophy progresses after the onset of stroke, resulting in secondary sarcopenia known as stroke-related sarcopenia. Sarcopenia after stroke affects various outcomes of stroke patients, including oropharyngeal dysphagia. However, the changes in masticatory and swallowing muscles that occur after the onset of stroke have not been studied. In the present study, we examined the changes in masticatory and swallowing muscles in patients with acute stroke and their effects on oropharyngeal dysphagia by determining the mass of masticatory and swallowing muscles using ultrasonography.

## Method

- The subjects of the study were 30 patients with acute stroke.
- Age, Gender, Stroke type, and National Institutes of Health Stroke Scale (NIHSS) were collected as basic information.
- The swallowing function of the subjects was assessed by the Functional Oral Intake Scale (FOIS)
- Ultrasonography (LUGIQ e, GE Healthcare Japan) was used to determine the tongue thickness (TT) and temporalis muscle thickness (TMT), and it was also measured at the onset of stroke and 2 weeks after the initial evaluation.
- To determine TT, the probe was placed perpendicular to the horizontal plane of Frankfurt and the distance from the surface of the mylohyoid muscle to the dorsal tongue was measured (Fig. 1).
- To determine TMT, the probe was placed 4.0 cm from the eyelid and 2.0 cm above it, and the distance from the deep temporal fascia to the temporal bone surface was measured.(Fig. 2)

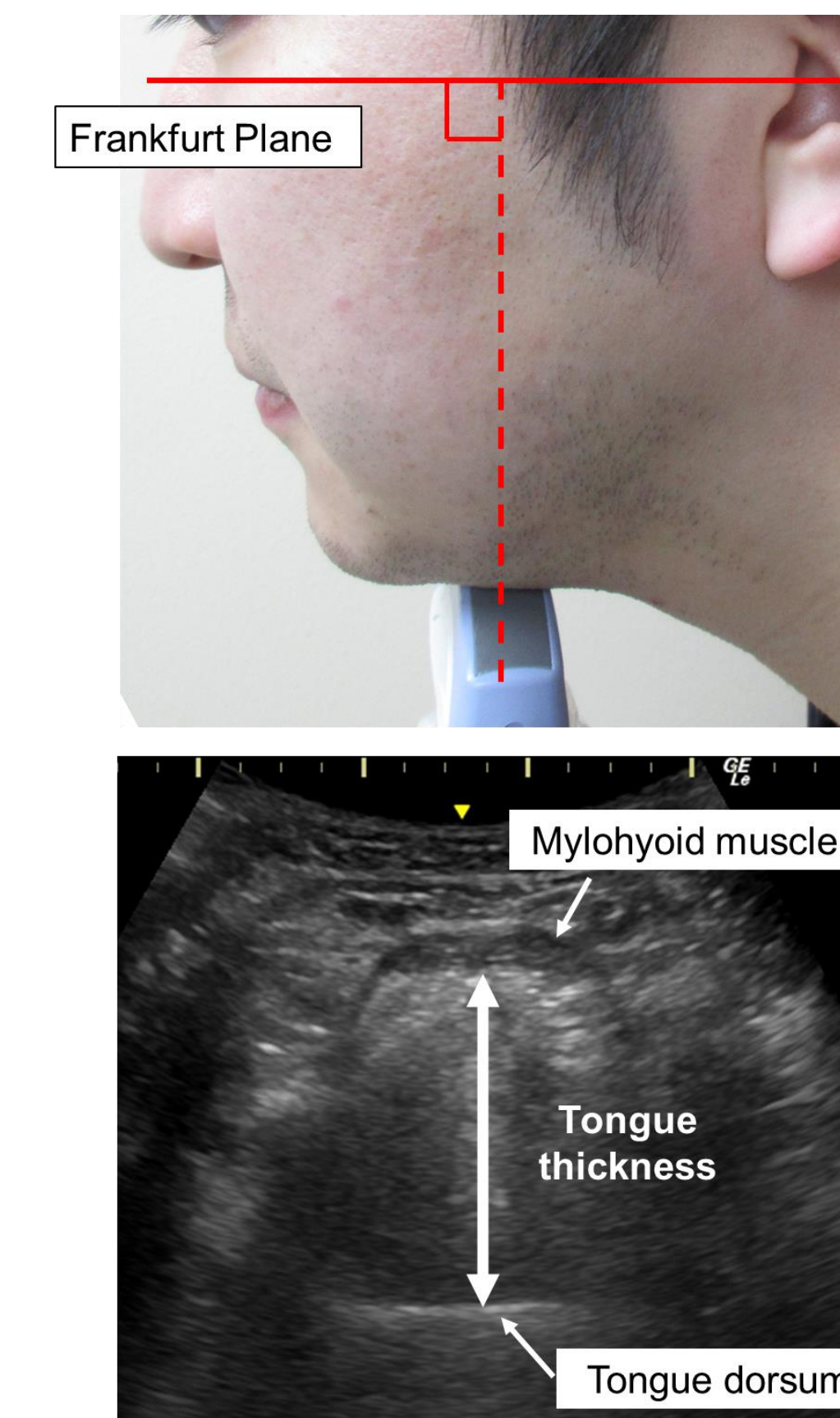


Fig.1 Measuring of TT

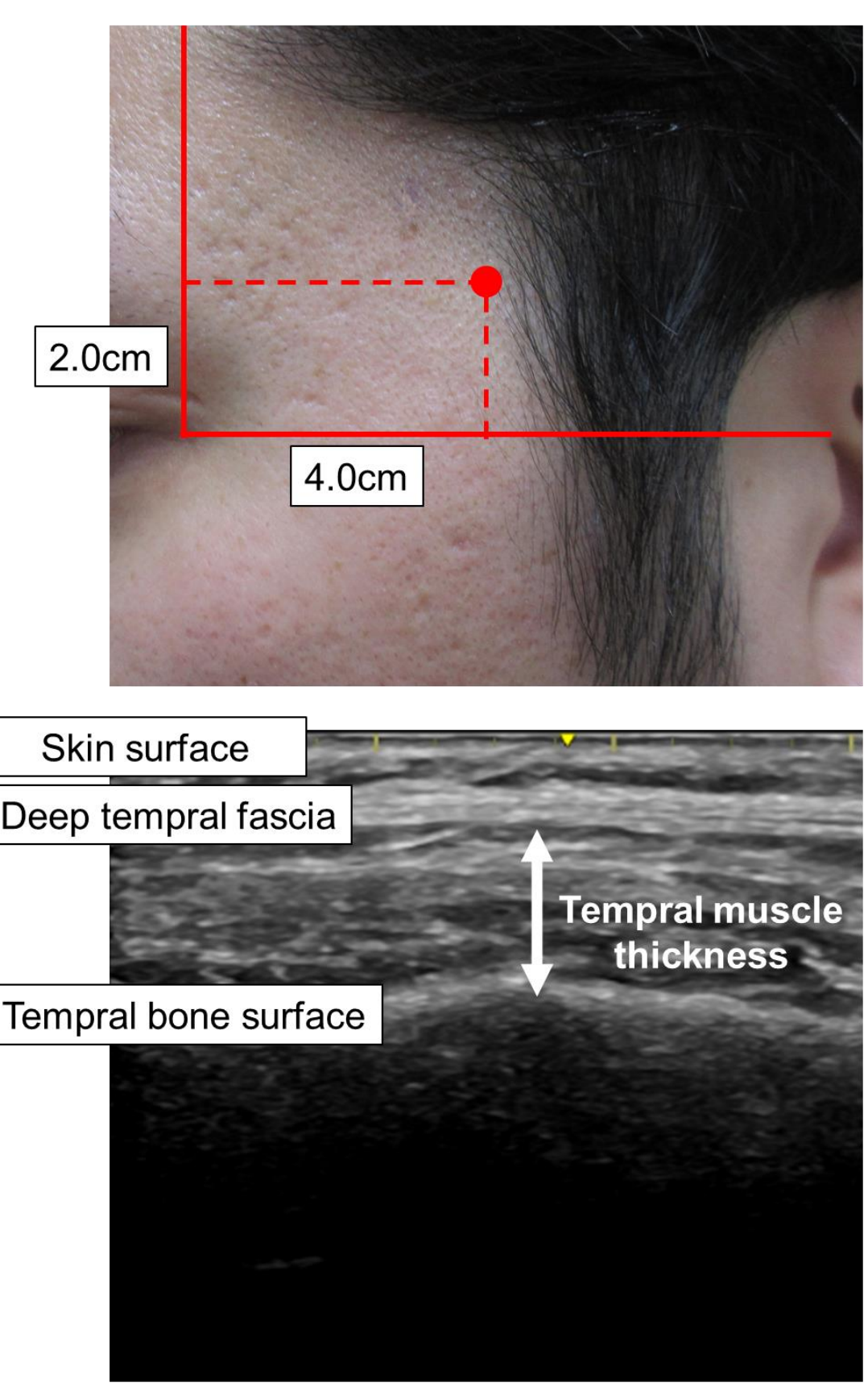


Fig.2 Measuring of TMT

## Result

Table1. Characteristics of subjects

| Characteristics    |                         | over all(n = 30)      |
|--------------------|-------------------------|-----------------------|
| Age(years)         |                         | 75.1(SD13.1)          |
| Sex                | Male/Female             | 18(56.7%) / 13(43.3%) |
| Type of stroke     | Ischemic stroke         | 21(70.0%)             |
|                    | Hemorrhagic stroke      | 7(23.3%)              |
|                    | subarachnoid hemorrhage | 2(6.7%)               |
| NIHSS on admission |                         | 8.27(SD7.75)          |

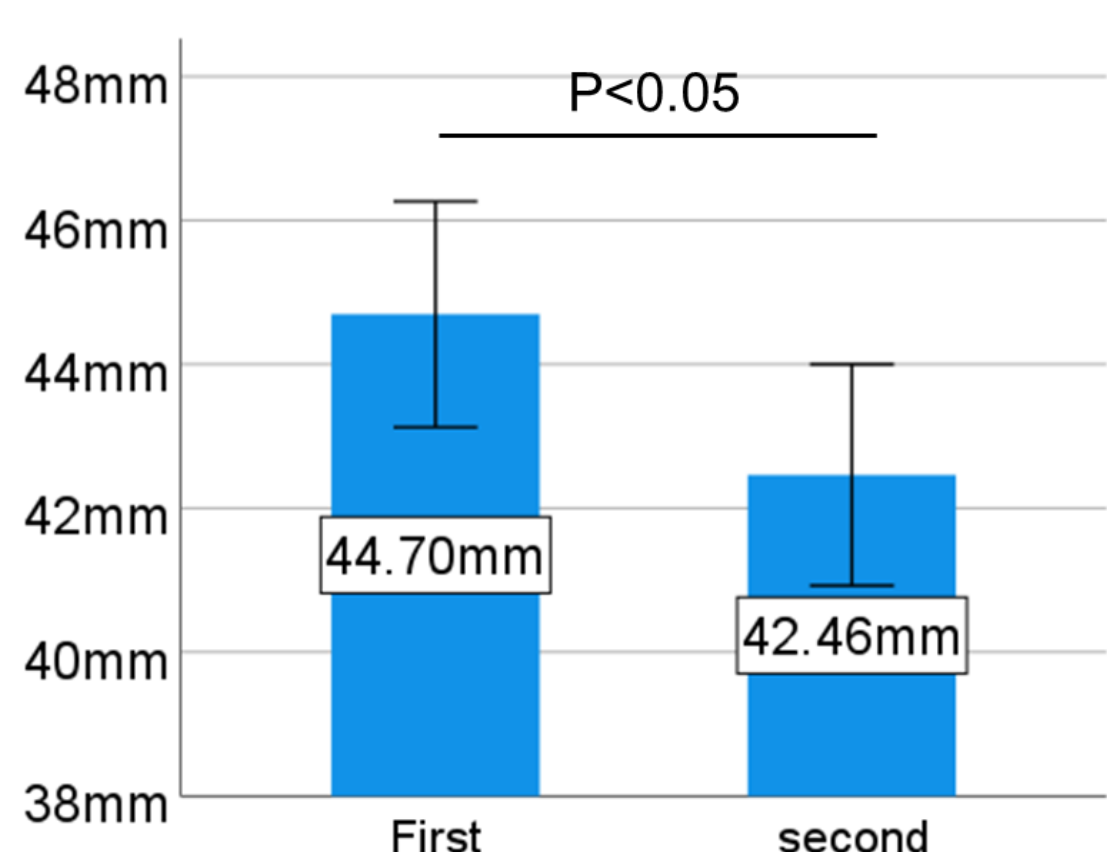


Fig3. Changes in TT between the first and second examination  
\* First : On set of stroke, Second : 2 weeks after onset

Table2. Swallowing function assessed by FOIS

| FOIS | Onset of stroke | 2 weeks after onset |
|------|-----------------|---------------------|
| 1    | 5(16.7%)        | 1(3.3%)             |
| 2    | 1(3.3%)         | 0                   |
| 3    | 1(3.3%)         | 0                   |
| 4    | 1(3.3%)         | 1(3.3%)             |
| 5    | 6(20.0%)        | 5(16.7%)            |
| 6    | 10(33.3%)       | 12(40.0%)           |
| 7    | 6(20.0%)        | 11(36.7%)           |

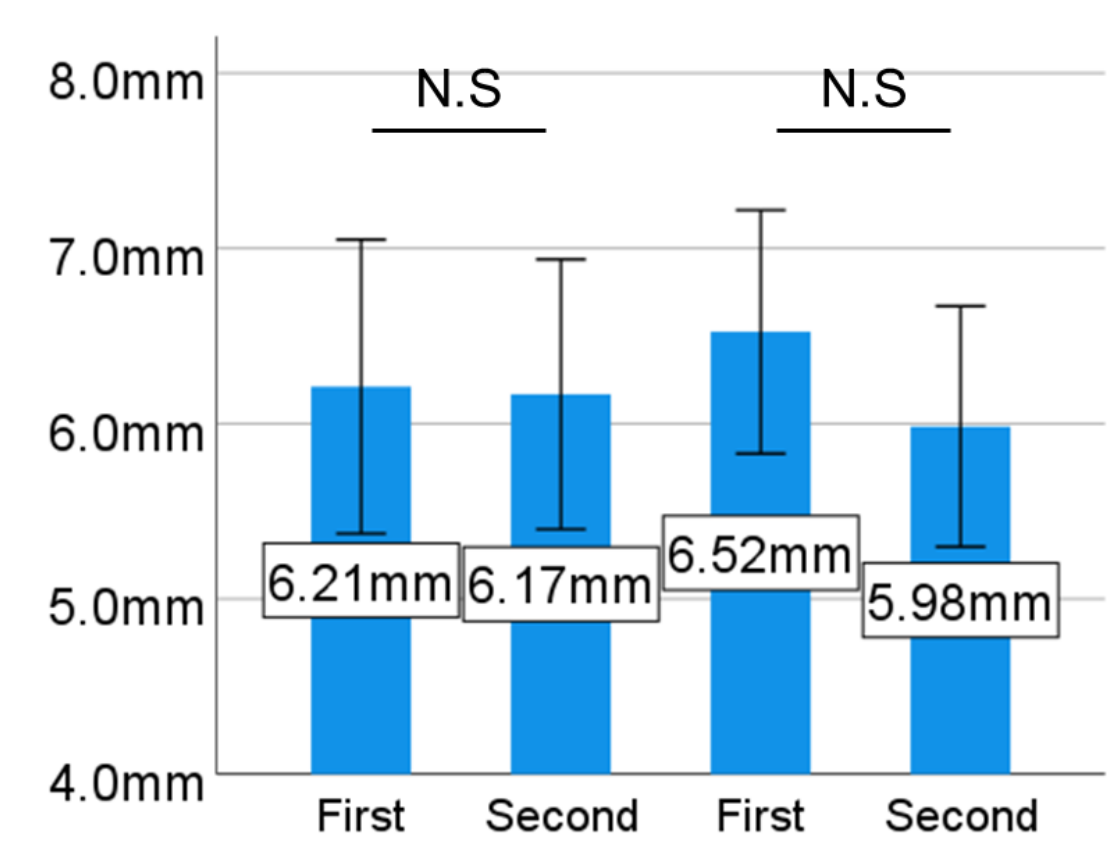


Fig4. Changes in TMT between the first and second examination  
N.S: Not Significant

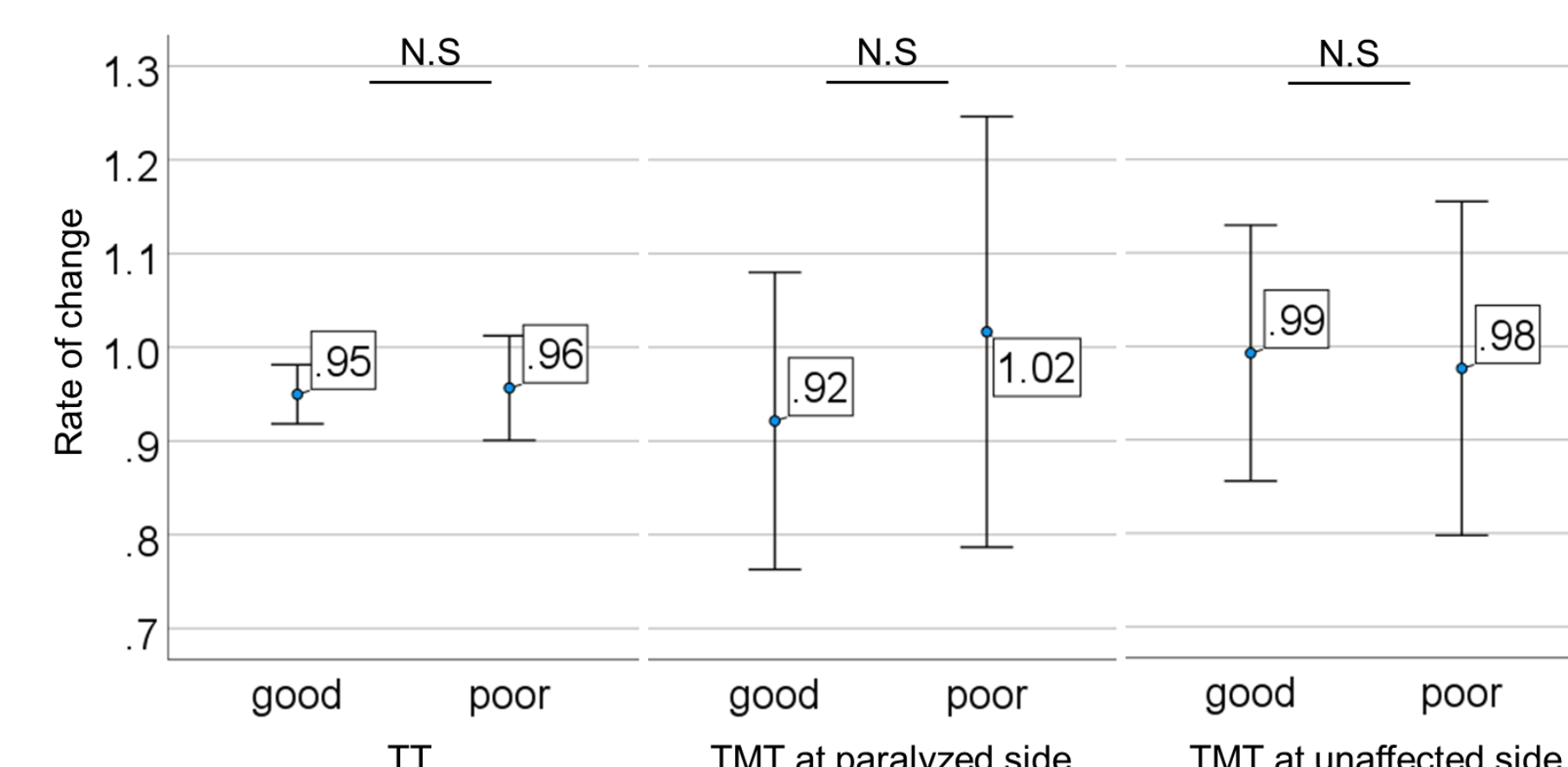


Fig5. Rate of Changes in good swallowing function group and poor swallowing function group  
\* good : FOIS ≤ 5 at initial evaluation(n=16), poor : FOIS ≥ 6 at initial evaluation

- The average of TT decreased significantly over time. (P < 0.05)(Fig.3)
- The average of TMT tended to decrease over time, but the difference was not significant.(Fig.4)
- The examination of the occurrence of oropharyngeal dysphagia and the rate of change in TT and TMT showed no significant difference.(Fig.5)

## Discussion

This result suggested that the stroke related sarcopenia may occur in masticatory and swallowing muscles. Disuse and malnutrition can exacerbate sarcopenia during the recover period. Therefore, appropriate exercise and nutritional management immediately after the onset of stroke are critical. The present study found no association between the progression of masticatory and swallowing muscle atrophy and oropharyngeal dysphagia. However, such atrophy may be associated with long-term swallowing function, and its extended examination is needed.

## Conclusion

The average of TT and TMT tended to decrease after onset stroke. Stroke-related sarcopenia has been suggested to occur in masticatory and swallowing muscles.

