암재활

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:08-10:12 Room G(3F)

P 1-27

Bioimpedance Analysis for Predicting Treatment Outcomes for Lower Extremity Lymphedema

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Objective

To investigate if bioimpedance analysis (BIA) predict treatment outcomes of complete decongestive therapy (CDT) in lower extremity lymphedema after gynecologic cancer surgery.

Methods

This study was a retrospective study of visits to a single lymphedema clinic after gynecologic cancer surgery from March 2015 to December 2018. CDT was performed on patients for 30 minutes per day, for 10 days (5 days per week). We conducted upper and lower extremity bioimpedance measurements using Inbody S10 (InBody, Seoul, South Korea) before and after CDT. Bioimpedance measurements were conducted after a 5 minutes rest. Also, circumference measurement of both lower extremities at above knee 20cm, above knee 10cm, below knee 10cm was conducted before and after CDT. To evaluate lower extremity lymphedema, we calculated the expected impedance at 0Hz (R0) of four extremities using multi-frequency BIA. To minimize BIA errors and compare the difference before and after CDT, we calculated the upper / lower extremity R0 ratio (R0U/L) using upper extremity R0 on the same side. We investigated the relationship between R0U/L of the affected side and the change of R0U/L and circumference before and after CDT in patients with unilateral lymphedema and bilateral lymphedema. Furthermore, we divided patients based on the duration between symptom onset and first BIA examination into acute group (within 6 months from onset) and chronic group (over 6 months from onset). Subgroup analysis was performed to determine the difference in BIA results between two groups.

Results

Total 59 patients were included analysis. 26 patients (31 lower limb) were included in acute group, and 33 patients (38 lower limb) were included in chronic group. R0U/L before CDT (initial R0U/L) was significantly correlated with R0U/L change before and after CDT in acute and chronic group. (r=0.373, p=0.04 in acute group, r=0.354, p=0.03 in chronic group) In acute group, R0U/L before CDT was significantly correlated with circumference change at above knee 20cm and 10cm. (r=0.427, p=0.02 at AK 20cm,

r=0.399, p=0.03 at AK 10cm) (Fig.1) R0U/L before CDT was significantly correlated with R0U/L change after adjustment for age and BMI in acute and chronic group. (r=0.513, p<0.01 in acute group, r=0.423, p<0.01 in chronic group) R0U/L before CDT showed a tendency to be correlated with circumference change in acute group. (Table 2)

Conclusions

This study is meaningful in confirming the usefulness of Inbody S10 for predicting treatment outcomes of CDT for lower extremity lymphedema. The results suggested that Initial BIA value tend to be correlate with treatment outcomes for lower extremity lymphedema in acute group. These findings implied that BIA for lower extremity lymphedema could one possible modality to predict treatment outcomes in the early stage of lymphedema rather than in the chronic stage. For this work, further large-scale prospective studies will be necessary.

Acknowledgment :none

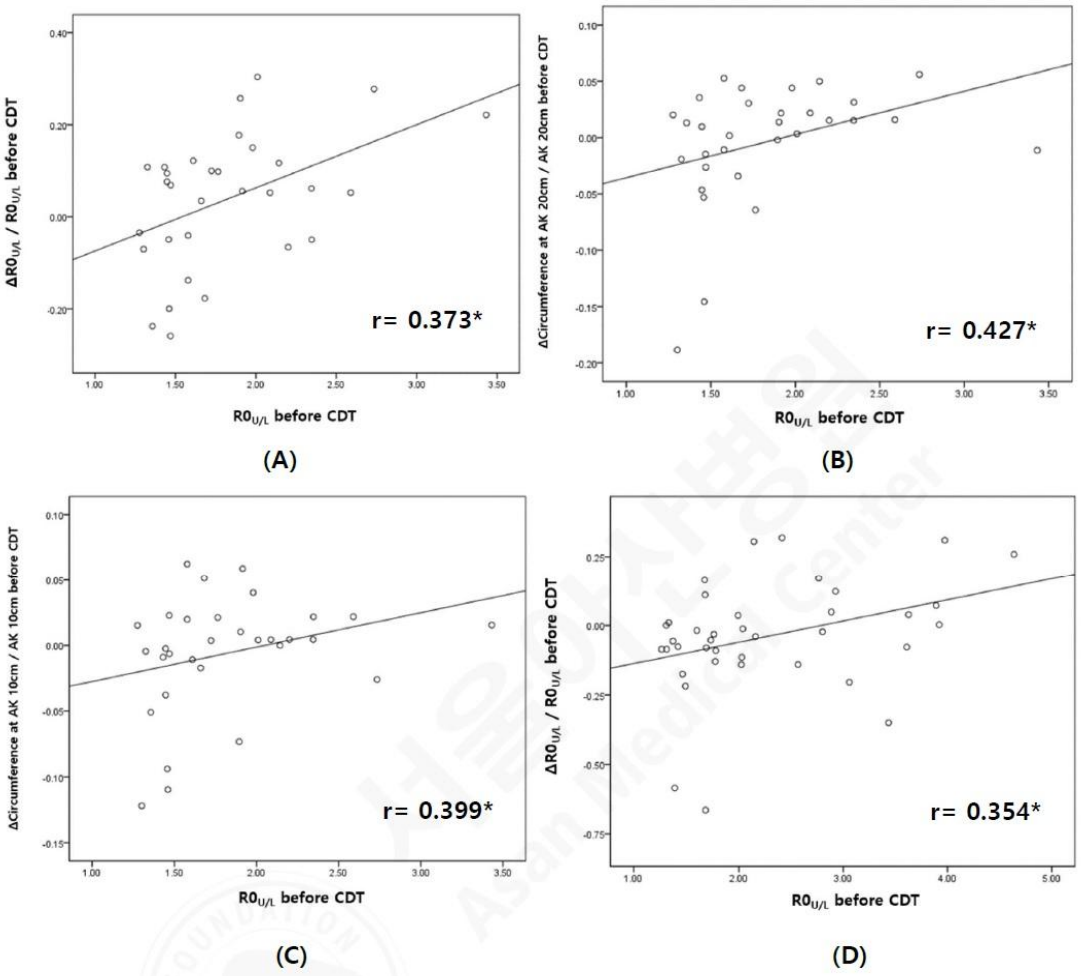
Table 1. Patients baseline characteristics and the change of bioimpedance value and lower extremity circumferences

Clinical variables	Acute group (n=26)	Chronic group (n=33)	p-value
Age (years)	53.38±10.23	57.33±9.66	0.07
Lesion side (Rt : Lt : Both)	5 : 12 : 9	6 : 11 : 16	
BMI (kg/m^2)	23.68±2.59	25.35±3.73	0.03*
Disease duration (month)	2.77±1.66	48.27±54.22	< 0.01*
Pre $R0_{U/L}$	1.82±0.49	2.28±0.92	0.06
$\Delta R0_{U/L}$ / Pre $R0_{U/L}$	0.04±0.14	-0.04±0.2	0.06
ΔCircumference at AK 20cm	-0.16±2.75	1.48±3.06	0.11
ΔCircumference at AK 10cm	-0.21±1.86	0.94±2.03	0.02*
ΔCircumference at BK 10cm	0.55±1.95	0.31±2.13	0.84

Note: Values are presented as mean ± standard deviation or numbers.

Abbreviations: BMI, Body mass index; $R0_{U/L}$, Upper/Lower extremity impedance ratio at 0Hz; Pre $R0_{U/L}$, $R0_{U/L}$ before complete decongestive therapy; AK, Above knee; BK, Below knee

* p<0.05, statistically significant in Mann-Whitney U test



*p<0.05, statistically significant in spearman's correlation analysis

Abbreviations: $R0_{U/L}$, Upper/Lower extremity impedance ratio at 0Hz; CDT, Complete decongestive therapy; AK, Above knee

Figure 1. Correlation of initial R0U/L and the change of lower extremity circumferences and R0U/L in acute group (A, B and C) and in chronic group (D)

Table 2. Partial correlation efficiency between initial R0U/L before CDT and the change of lower extremity circumference and R0U/L after adjustment for age and BMI

	Pre $R0_{U/L}$	p-value
Acute group (n=31)		
Δ$R0_{U/L}$ / Pre $R0_{U/L}$	0.513	<0.01*
ΔCircumference / Pre at AK 20cm	0.357	0.06
ΔCircumference / Pre at AK 10cm	0.307	0.10
ΔCircumference / Pre at BK 10cm	0.259	0.18
Chronic group (n=38)		
Δ$R0_{U/L}$ / Pre $R0_{U/L}$	0.423	<0.01*
ΔCircumference / Pre at AK 20cm	-0.016	0.93
ΔCircumference / Pre at AK 10cm	0.254	0.14
ΔCircumference / Pre at BK 10cm	-0.190	0.27

Abbreviations: BMI, Body mass index; $R0_{U/L}$, Upper/Lower extremity impedance ratio at 0Hz; Pre $R0_{U/L}$, $R0_{U/L}$ before complete decongestive therapy; AK, Above knee; BK, Below knee