

# The Requirements for Laparoscopy-Assisted Distal Gastrectomy to Become Standard Procedure for Gastric Cancer: Based on Qualitative Study of Surgeons' Experiences

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## Abstract

Laparoscopy-assisted distal gastrectomy (LADG) has become one of the standard surgical procedures for gastric cancer in Japan and Korea. However, LADG is currently listed as being in the clinical research phase under the Gastric Cancer Treatment Guidelines. The aim of this study is to report surgeons' opinions of what is needed if LADG is to become a standard procedure. We conducted questionnaire survey with open questions in hospitals that either applied or did not apply LADG and compared the answers. We labeled and categorized the collected data using content analysis. The number of hospitals which applied LADG more than doubled from 5 to 12 hospitals over 3 years. Overall, hospitals reported that the necessary elements for LADG to become a standard procedure are: clinical trials of LADG (n = 5, 22.7%), surgeons' practical experience in performing LADG (n = 4, 18.2%), stability of radical treatment (n = 4, 18.2%), and a shorter operative duration (n = 3, 13.6%) for the procedure. Surgeons' practical experience was chosen as the most important requirement in the hospitals which applied LADG while clinical trials (n = 2, 40.0%) and stability of radical treatment (n = 2, 40.0%) were the most common answers in the hospitals which did not apply LADG. Hospitals and surgeons' practical experience, stabilizing radical cure, and the large scale of clinical trials are for LADG to become a standard procedure and to gain

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equivalent importance as open distal gastrectomy in treating gastric cancer.

## Keywords

Laparoscopy, Questionnaire Survey, Content Analysis, Open Distal Gastrectomy, Surgical Procedure

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## 1. Introduction

Laparoscopy-assisted distal gastrectomy (LADG) has garnered interest as a surgical procedure for gastric cancer that is noninvasive and that offers better postoperative outcomes than other available procedures [1]-[4]. It has recently become a standard procedure in Japan and Korea [5]-[8]. According to data collected by the Japan Society for Endoscopic Surgery, laparoscopy-assisted gastrectomy (LAG) for gastric cancer/submucosal gastric tumors was performed on more than 7900 patients, and in 2009, 60% of hospitals in Japan [9] used laparoscopic surgery. LADG was the most commonly performed procedure among various types of LAG in Japan. However, LADG is currently listed in the clinical research phase under the Gastric Cancer Treatment Guidelines; as such, careful management and study are needed before that LADG is disseminated as a standard procedure [10]. No study has reported the state of introduction/annual changes in individual areas or hospitals in Japan, or individual hospitals'/surgeons' opinions regarding LADG. The purpose of our study was to learn surgeons' opinions about what requirements should be met before LADG become a standard procedure and to learn about changes in its application after a period of 3 years. With this aim, we conducted a questionnaire survey with open-ended columns at the 2012 Toyama Surgical Procedure Conference and compared it with a similar survey taken in 2009 using content analysis.

## 2. Methods

### 2.1. Subjects

We surveyed the chairs of the surgery departments at Japanese hospitals that are affiliated with Toyama Surgical Procedure Conference to clarify the current introduction of LADG in Toyama Prefecture. We surveyed 14 hospitals in 2009 and 17 hospitals in 2012 with an open-ended questionnaire. The surgeons who participated in our study consented to cooperate with the study by submitting the survey. Surgeons from 13 out of 14 hospitals we surveyed in 2009 and from all 17 hospitals in 2012 cooperated with the survey.

### 2.2. Questionnaire

In 2012, we asked surgeons at the hospitals which applied LADG and surgeons at the hospitals which did not apply LADG about 1) their standard surgery for gastric cancer, 2) what they thought was required for LADG to become a standard procedure with an open-ended questionnaire, and 3) the merits and limitations of LADG compared with open distal gastrectomy (ODG) (only for the surgeons who had experience with LADG). The questionnaire included items to show the background of the hospitals in our survey (shown in **Table 1** and **Table 2**). We also added the item "Diagnosis Procedure Combination (DPC) system introduction". The DPC system is a Japanese comprehensive medical payment system that decides method of medical payment responsibility by assigning patients a diagnostic group and can shorten a patient's hospital stay after LADG according to the DPC coding [11].

### 2.3. Statistical Analysis

The Student's t-test and the Chi-square test were used to analyze for significant differences in the background of the participating Toyama hospitals we surveyed in 2009 and 2012 (**Table 1**). The data we collected from the two questionnaire surveys was analyzed and compared using the Student's t-test, the Chi-square test and Yates' chi-squared test where appropriate to test significant differences in LADG application after 3 years had passed (**Table 2**).

**Table 1.** Background of hospitals which cooperated with the survey.

Item	2009	2012	P value
	(N = 14)	(N = 17)	
No. of registered beds, mean $\pm$ SD	392 $\pm$ 169	370 $\pm$ 177	0.73*
No. of surgeons, mean $\pm$ SD	6.1 $\pm$ 2.6	6.1 $\pm$ 2.9	0.93*
Hub Hospital in the Oncology Care Network (n, yes/no)	9/5	10/7	0.95 <sup>†</sup>
DPC introduction (n, yes/no)	12/2	15/2	1.00 <sup>‡</sup>

\*Student's t-test, <sup>†</sup>Chi-square test. DPC: Diagnosis Procedure Combination.

**Table 2.** 2009 and 2012 questionnaire data.

	2009	2012	P value
	(N = 14)	(N = 17)	
Introduction of LADG (n, yes/no/unknown)	5/9/0	12/5/0	0.11 <sup>‡</sup>
Patients for whom LADG was indicated (n, %)			
cMN0	0 (0)	0 (0)	
IA	6 (60.0)	8 (50.0)	0.98 <sup>‡</sup>
IB	3 (30.0)	6 (37.5)	
II	1 (10.0)	2 (12.5)	
Extent of lymph node dissection in patients undergoing LADG (n, yes/no/unknown)	2/10/2	0/14/3	0.27 <sup>†</sup>
Reconstruction in patients undergoing LADG (n, %)			
Billroth I	8 (57)	8 (53)	
Billroth I/Roux-en-Y	4 (29)	6 (40)	0.97 <sup>‡</sup>
Billroth I/Billroth II	2 (14)	1 (7)	
Duration of LADG surgery (hours), mean $\pm$ SD	4.35 $\pm$ 0.99	4.05 $\pm$ 0.81	0.57 <sup>†</sup>
Average length of hospital stay after LADG (day), mean $\pm$ SD	12.1 $\pm$ 2.25	15.25 $\pm$ 2.61	0.03 <sup>**†</sup>
LADG-related increase in the incidence of complications (n, yes/no/unknown)	0/4/10	2/8/7	1.00 <sup>‡</sup>
Could LADG become a standard treatment in the future? (n, yes/no/unknown)	7/7/0	13/1/3	0.03 <sup>**‡</sup>

Values are presented as n or mean  $\pm$  SD. \*P < 0.05 is significant difference, <sup>†</sup>Student's t-test, <sup>‡</sup>Chi-square test, Yates corrected. LADG: laparoscopy-assisted distal gastrectomy. ODG: open distal gastrectomy.

## 2.4. Content Analysis

We divided the cooperating hospitals into 2 groups: hospitals which applied LADG and hospitals which did not apply LADG, and compared our 2012 survey results with those of a similar questionnaire survey carried out 3 years previously at the conference. We selected the responses to the open-ended questions about requirements for LADG to become a standard procedure and the merits and limitations of LADG compared with ODG from hospitals which applied LADG and which did not apply LADG (**Table 3**, **Table 4**) and labeled and categorized them according to the content analysis method [10].

## 3. Results

The survey collection rate was 100%. 14 hospitals responded in 2009 and 17 hospitals responded in 2012.

### 3.1. Background of Hospitals Which Cooperated with the Survey

The number of hospitals which introduced the DPC system increased between 2009 and 2012, but the data did not show significant differences. The other background contents of hospitals also did not show any significant differences after 3 years (**Table 1**).

**Table 3.** Requirements for LADG to become standard procedure.

Requirements	hospitals which applied LADG	hospitals which did not apply LADG
	No. of responded hospitals = 12	No. of responded hospitals = 5
	( n )	( n )
Surgeons' practical experience	4	
Large number of clinical trials	3	2
Safety of procedure	3	
Stability of radical treatment	2	2
Shorten operative duration	2	1
Appropriate application of LADG	2	
Social recognition	1	
Total	17	5

LADG: laparoscopy-assisted distal gastrectomy.

**Table 4.** Merits and limitations of LADG compared to ODG reported by surgeons in the hospitals which applied LADG.

Merits	n	%	Limitations	n	%
Magnified vision effects	4	25.0	Prolonged duration of surgery	5	35.7
Early surgical recovery	3	18.8	Limited surgical field	2	14.3
Cosmetic features	2	12.5	Instrumental limitations	2	14.3
Wound pain reduction	2	12.5	Limitations regarding hemorrhage	1	7.1
Lower volume of hemorrhage	2	12.5	Technical difficulty	1	7.1
Early discharge	2	12.5	Many surgeons are required	1	7.1
Low incidence of SSI	1	6.3	Limited number of surgeons	1	7.1
			Unfavorable operating conditions if complications arise	1	7.1
Total	16			14	

LADG: laparoscopy-assisted distal gastrectomy. ODG: open distal gastrectomy. SSI: surgical site infection.

### 3.2. Comparison of Survey Results from 2009 and 2012

In the 2012 survey, 12 (70.6%) of the 17 hospitals reported the clinical introduction of LADG. This percentage was markedly higher than that of the previous survey's 35.7%; this difference was not significant, which was possibly due to the limited number of hospitals studied (Chi-square test, Yates corrected:  $P = 0.11$ ) (Table 2).

There are two significant differences showed in Table 2: one is the average length of hospital stay after the LADG procedure, which was extended (Student's  $t$ -test:  $P = 0.03$ ), and the another is the possibility of LADG becoming a standard procedure in future, which increased from 7 hospitals to 13 hospitals reporting the possibility (Chi-square test, Yates corrected:  $P = 0.03$ ). Otherwise, there were no significant differences between the survey responses.

### 3.3. Comparison of Requirements for LADG as a Standard Procedure

We compared hospitals which applied LADG and which did not apply LADG about their opinion of the requirements needed to be met before LADG becomes a standard procedure. The requirement cited the most by the hospitals which applied LADG was the necessity of surgeons' practical experience ( $n = 4$ ), and the next most frequent requirements listed were the need for a large number of clinical trials and the necessity of insuring the safety of the procedure. ( $n = 3$ , respectively, Table 3). On the other hand, the hospitals which did not apply LADG cited the need for a large number of clinical trials and for the stability of radical treatment as the most important requirements ( $n = 2$ ), followed by "shorten operative duration" as the next most important requirement ( $n = 2$ , Table 3).

### 3.4. Merits and Limitations of LADG Comparing to ODG

Surgeons from the hospitals which applied LADG cited magnified vision effects as the greatest merit of LADG compared with ODG ( $n = 4$ , 25%, **Table 4**). The second merit they listed was early surgical recovery ( $n = 3$ , 18.8%). In contrast, most surgeons cited the long operating time of LADG as a limitation ( $n = 5$ , 35.7%) followed by limited surgical field and instrumental limitations ( $n = 2$ , 14.3%, respectively).

## 4. Discussion

This study is the first to show the importance of obtaining a qualitative analysis of surgeons' experience with and opinions of LADG in an area where hospitals which applied LADG have more than doubled over 3 years. The most important factor in this study is that surgeons with LADG experience and without LADG experience each noted different requirements for LADG to become a standard procedure. This implies that each phase in the process of LADG becoming a standard procedure will require flexible provisions for surgeons with and without LADG experience. The hospitals which did not apply LADG stated the importance of clinical trials and stability of radical treatment as the top requirements for LADG to become a standard procedure. On the other hand, the hospitals which applied LADG stated surgeons' practical experience, clinical trials and stability of radical treatment as the requirements for LADG to become a standard procedure. The results showed that psychological factors, such as the belief that LADG is unreliable, were a barrier to making LADG a standard procedure in the hospitals which did not apply it although the previous studies have showed LADG as equivalently safe as ODG [6] [12]-[17]. Therefore, it is important to run clinical trials to show that LADG is as safe as ODG and to disseminate the trial results. After psychological barriers to the implementation of LADG are eliminated by such clinical trials, it will be necessary to prepare a training program in the LADG procedure to improve surgeons' practical experience. Furthermore, it will be important to test the efficacy of these training programs.

The second important factor in our study was that the merits of LADG evaluated by surgeons at the hospitals which applied LADG contributed largely to patients' QOL. On the other hand, the limitations of LADG were material and human resources such as facilities, equipment, and surgeons' inexperience. As mentioned earlier, a training program could address these limitations.

As for the rest of the factors, the Gastric Cancer Treatment Regulations and Gastric Cancer Treatment Guidelines were revised in 2010, respectively. In the previous version, the group of lymph-node metastases was decided by the number of metastases. Therefore, for staging, the old regulations set forth in Gastric Cancer Treatment Regulations Version 13 were utilized to match the two surveys. The extent of lymph node dissection was evaluated as D1 and D1+ which narrowed the extent in accordance with the Gastric Cancer Treatment Guidelines Version 3, but there was no significant difference in the two surveys ( $P = 0.27$ , **Table 2**).

The average length of hospital stay after LADG extended in the 3 years between surveys, and was significantly different (as shown in **Table 2**) although early surgical recovery was one of the merits of LADG procedure. Since the medical service fee payment system was revised between 2009 and 2012, early hospital discharge could have an effect on hospital revenue. Hospitals tend to accelerate hospital discharge at the beginning of the DPC system introduction because they are not used to coding with DPC. The early hospital discharge as a result of DPC coding could cause a decline in hospital revenue. The economic demand from the Medical Professions Divisions to extending hospital stays as long as possible after the LADG procedure to maintain hospital revenue that could affect the results in **Table 2**, which showed a significant difference despite expected results ( $P = 0.03$ ). This dilemma between early hospital discharge after LADG procedure and financial pressure from hospital management will be solved when the national length of the hospital stay after LADG is standardized and the hospital stay in division of medical service fee system is revised every time.

This study has two limitations: first, the sample size is small. Second, the survey area is limited so that the generalizability of these survey results is not guaranteed. Nevertheless, this study gave significant insight into surgeons' and hospitals' opinions of the requirements needed for LADG to become a standard procedure. The surgeons who had experience with LADG found many advantages for QOL with LADG, and the limitations noted for LADG were most commonly due to surgeons' lack of practical experience. These factors indicated the need for the development of a LADG training program for surgeons.

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Hospitals which cooperated with this survey:

Saiseikai Takaoka Hospital, Toyama prefecture  
 Imizu Municipal Hospital  
 Tonami General Hospital  
 Toyama Prefectural Central Hospital  
 Toyama City Hospital  
 Toyama Red Cross Hospital  
 Toyama University Hospital  
 Takaoka City Hospital  
 Kouseiren Takaoka Hospital  
 Saiseikai Toyama Hospital  
 Kouseiren Namerikawa Hospital  
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 Hokuriku Central Hospital  
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