ORIGINAL ARTICLE

Day surgery is effective and safe for patients with great saphenous vein varices who meet American Society of Anesthesiologists I-II grading

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Abstract

Background and Aim: Since the concept of "Day Surgery" (DS) was firstly put forward in 1995, DS for great saphenous vein varices (GSVV) becomes more and more dominant in worldwide, but it is accepted only in a limited population in China. Hence in the present retrospective study, patients who received DS and regular surgery are compared to assess the effectiveness and safety of DS for GSVV.

Patients and Methods: From 2011 to 2013, 452 patients who received DS and 372 patients who received inpatient surgery (IS) were collected from hospital main clinical database. Baseline characteristics, prognosis, and 12-month-long follow-up were compared.

Results: Mean age in DS group was 52.76 ± 4.89, 53.42 ± 5.52 in IS group. During follow-up after surgery, incidence of deep vein thrombosis (DVT), saphenous nerve injury (SNI), wound infection, and recurrence in DS and IS groups was 0.9% versus 0.8%; 2% versus 3%; 3.3% versus 3.8%; and 1.3% versus 1.1%, respectively. Moreover, there was no significant difference in incidence of DVT, SNI, wound infection, and recurrence between groups (P = 0.904; 0.376; 0.719; and 0.742). However, average hospital stays in DS group was 1 day, compared to 4.2 days in IS group. Moreover with respect to average medical cost (dollar), it was 780.33 dollars and 1021.06 dollars in DS and IS group, respectively.

Conclusion: DS for GSVV is an effective and safe procedure, which was the same as IS. However compared with IS, DS could decrease the average medical cost for patients and hospital stays obviously. Hence DS for GSVV is a win-win procedure for patient and health care.

Key words: Ambulatory surgery center, cost-effect, day surgery, great saphenous vein varices, safety

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Introduction

According to Annals of Chinese Ministry of Health in 2012;[1,2] individual medical cost has grown in large scale from 2010 to 2012. The increasing was more than 50%, to 357 dollars. Moreover proportion of health expenditure to government spending is up to 5.15% in 2012. However, in terms of 6.98 billion times consulted in health system in 2012, medical resource seems relative deficient. Therefore, how to satisfy patients' growing health needs with limited resource is a current problem.

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Day surgery (DS), also known as ambulatory surgery, means patients undergo surgery or invasive examination without staying in hospital. Patients should be discharged in one working day after surgery. The concept of "DS" was firstly put forward in 1995, and then become more and more popular in developed and developing countries thereafter.[3-5] In 2010, it estimated that more than 80% of surgeries were performed in ambulatory surgery center (ASC) in the US.[6] Avoiding hospitalization can result in cost savings in terms of patients and health care. According to Scott and White Hospital's report, medical cost for great saphenous vein varices (GSVV) in ASC and inpatient surgery (IS) is 906 dollars and 4241 dollars, respectively.[7]

GSVV is a common disease, of which morbidity in male is 30–50%, and in female is about 50%.[8] Categories of DS now are more than 1000;[5,9] and DS for GSVV is one developed kind, which is firstly performed in 2011 in our hospital. In the present study, feasibility and efficacy of DS for GSVV is accessed through comparison between DS group and IS group.

Patients and Methods

Total of 824 GSVV patients were enrolled from hospital main clinical database between Feb, 2014 - Sep, 2014. In them, 452 patients received DS and 372 patients received IS. Their clinical data were analyzed retrospectively.

Inclusion and exclusion criteria

When admission, demographics (age, gender, and educational status), physical parameter (height, weight, and body mass index), history (smoking, drug, and alcohol abuse), and comorbidity and laboratory tests (albumin and hemoglobin) were documented in standardized database by nurses and doctors.

Inclusion criteria

Symptomatic primary incompetence of the GSV with reflux time exceeded 0.5 s and diameter was 5 mm (at mid-thigh level) at least according to duplex ultrasound (DUS) examination. Patients met American Society of Anesthesiologist I–II grade assessed by anesthesiologist in outpatient consultation.

Exclusion criteria

Acute deep vein thrombosis (DVT), chronic DVT without recanalization, vascular malformation, agenesis of the deep venous system, post thrombotic syndrome of the obstruction type, pregnancy, and weak general condition. C6 Grade is excluded (according to Clinical-Etiology-Anatomy-Pathophysiology classification).

Procedure

Perioperative management

Preoperative management was the same for DS and IS groups and it included: Complete blood count, blood biochemistry, coagulation index, pretransfusion test, blood type, chest X-ray, and electrocardiogram. DUS of saphenous vein, iliac vein, and inferior cava vein was necessary. Povidone-iodine Solution was offered to patients in the two groups for limb disinfection at the night before surgery. High ligation and varices stripping was adopted in both DS and IS groups, and no antibiotics were used after surgery orally or intravenously. In IS group, elastic bandages were removed at the end of 3rd day after surgery and then patients were discharged. By contrast, patients were discharged in 1st day after surgery, and likely bandages were removed at the end of 3rd day after surgery in out-patient department. Stiches removal occurred in postoperative 12–14 days in both groups.

Follow-up after surgery

When bandage removed, subcutaneous induration, sore, swelling, and varices residual were compared between DS and IS groups. Discharged patients were followed up by outpatient consultation or call. Each patient had same standard follow-up form and was followed at end of 1st, 3rd, 6th, and 12th month after discharged. Call follow-up was at the same interval. In follow-up form, wound condition (infection), limb condition (sensation), and surgical effectiveness (recurrence) were focus. In this study, primary end-point was identified as DVT, saphenous nerve injury (SNI), wound infection, recurrence or 12 months later after discharged.

Ethics

The study was approved by the Ethics Committee of Hospital. All study participants provided a written informed consent to agree the clinical data to be used in clinical research.

Analysis method

The Chi-square test was used to perform analysis for categorical variables and Student's *t*-test for continuous variables. Survival analysis was conducted through Kaplan–Meier survival curves, and differences were compared using the log-rank test. Analysis was performed using SPSS version 16 (SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered significantly different.

Results

Four hundred and fifty-two patients received DS with mean age 52.76 ± 4.89, by contrast, 372 patients received IS with mean age 53.42 ± 5.52. No significant different baseline characteristics were found. Details of baseline characteristics were shown in Table 1.

Early outcome showed no significant difference which are shown in Table 2. Sore and swelling usually would be relieved in 4 weeks, but in terms of severe swelling, DVT should be excluded cautiously. Varices residual reflected surgery effectiveness, which easily results in recurrence. In DS group, varices residual occurred in 11 patients (2.43%), and recurrence happened to 6 of them. Likely, in IS group, 9 patients had obvious residuals (2.42%) and 4 of them appeared recurrence.

During follow-up, complication occurred in 34 and 32 subjects in DS and IS groups, respectively. Moreover incidence of DVT, SNI, wound infection, and recurrence in DS and IS groups was 0.9% versus 0.8%; 2% versus 3%; 3.3% versus 3.8%; and 1.3% versus 1.1%, respectively. Survival analysis showed no significant difference was found in incidence of DVT, SNI, wound infection, and recurrence between groups (log rank $P = 0.904$; 0.376; 0.719; and 0.742). Survival curve was shown in Figure 1a-d. In another word, there is no difference in effectiveness and safety between DS and IS groups. In subgroup analysis, bilateral and unilateral surgery in DS group [Figure 2] showed no significant difference in incidence of complications (DVT, SNI, wound infection, and recurrence) after surgery during follow-up ($P = 0.965$; 0.685; 0.227; and 0.956, respectively). It was in accordance with that in IS group.

Moreover, in terms of cost-benefit analysis, DS group seemed to be superior to IS group. Preoperative waiting time and hospitals stays in DS group were 0 day and 1 day, respectively.

Table 1: Baseline characteristics comparison in DS and IS groups

	DS group	IS group	*P*
Age	52.76±4.89	53.42±5.52	0.076
Gender (male/female)	195/257	171/201	0.439
Educational status	231/221	172/200	0.183
Urban/suburban	300/152	270/102	0.058
Smoking	121/331	97/215	0.874
Alcohol abuse	107/345	77/295	0.315
BMI	21.22±2.93	22.44±2.99	0.061
HGB	120.24±20.36	126.91±22.23	0.755
ALB	39.45±3.92	39.87±4.28	0.610
DM	91/361	92/280	0.129
Hypertension	111/341	87/285	0.743

P<0.05 was considered different significantly. Educational status=High school degree and above/high school degree below. BMI=Body mass index; HGB=Hemoglobin; ALB=Albumin; DM=Diabetes mellitus; DS=Day surgery; IS=Inpatient surgery

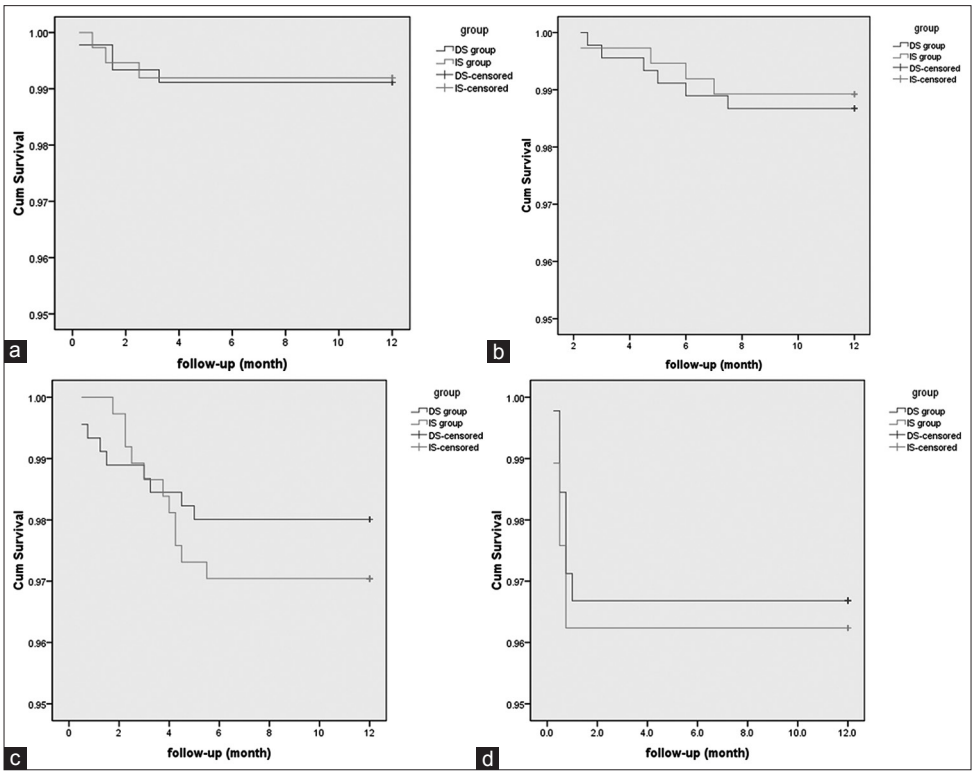

Figure 1: (a) Follow-up comparison in deep vein thrombosis between day surgery and inpatient surgery groups. Incident rate of deep vein thrombosis had no significant difference between day surgery and inpatient surgery group, *P*>0.05. (b) Follow-up comparison in recurrence between day surgery and inpatient surgery groups. Incident rate of recurrence had no significant difference between day surgery and inpatient surgery group, *P*>0.05. (c) Follow-up comparison in saphenous nerve injury between day surgery and inpatient surgery groups. Incident rate of saphenous nerve injury had no significant difference between day surgery and inpatient surgery group, *P*>0.05. (d) Follow-up comparison in wound infection between day surgery and inpatient surgery groups. Incident rate of wound infection had no significant difference between day surgery and inpatient surgery group, *P*>0.05

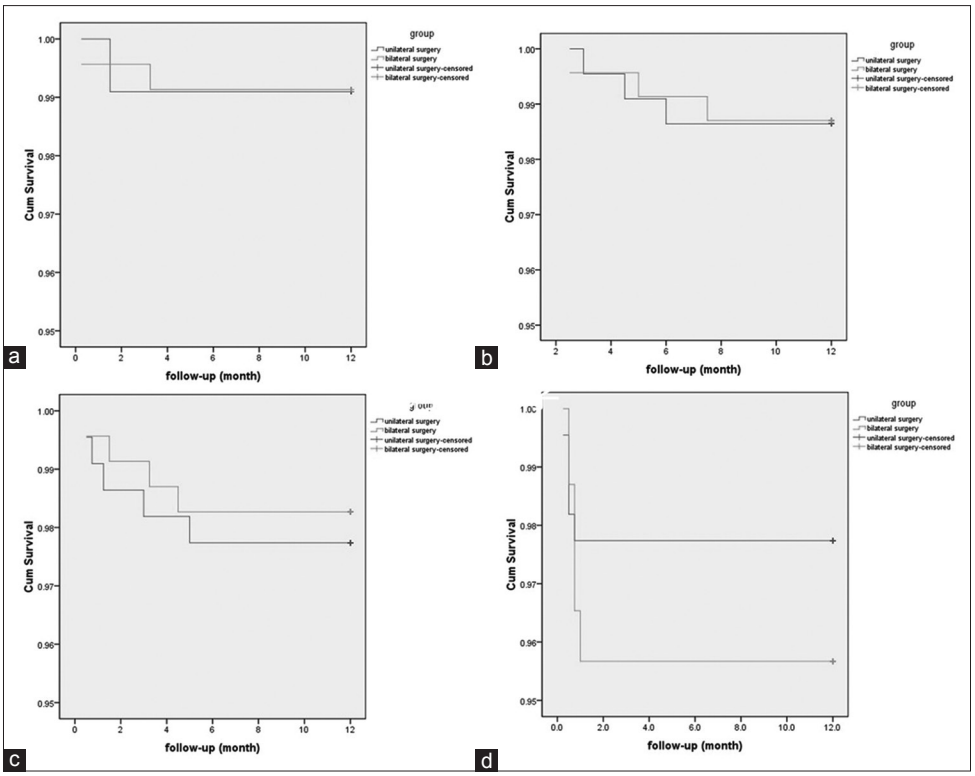

Figure 2: Follow-up comparison in day surgery subgroup analysis. Incident rate of postoperative complications (deep vein thrombosis, recurrence, saphenous nerve injury, and wound infection) had no significant difference between unilateral surgery and bilateral surgery, $P>0.05$. (a-d) It referred deep vein thrombosis, recurrence, saphenous nerve injury and wound infection

Table 2: Early outcome comparison between DS and IS groups

	DS group	IS group	*P*
Subcutaneous induration	32	30	0.599
Sore	38	41	0.235
Swelling	67	71	0.111
Varices residual	11	9	1

$P<0.05$ was considered different significantly. DS=Day surgery; IS=Inpatient surgery

Table 3: Cost-effect analysis in DS and IS group

	DS group	IS group
Preoperative time (day)	0	1
Surgery time (min/per limb)	38.2	36.7
Hospital stays (day)	1	4
Average medical cost for isolated limb (dollar)	780.33	1021.06

DS=Day surgery; IS=Inpatient surgery

By contrast, in IS group, it was 1 day and 4 days, respectively. With respect to average medical cost (RMB/dollar, exchange rate = 6.25), it was 4877.08/780.33 and 6381.61/1021.06 in DS and IS group, respectively. Cost-benefit analysis was shown in Table 3.

Discussion

The present study has approved that DS was a safe and effective way which is equal to IS. All GSVV surgeries in DS and IS groups were successful, and no case of femoral vein or artery injury happened in both groups during surgery. Early outcome showed no significant difference in the two groups. Moreover, with respect to follow-up, no significant difference was found in incidence of DVT, SNI, wound infection, and recurrence between DS and IS groups. It is known that recurrence in 12 months,[10] short period after surgery was closely associated inadequate surgery representing surgical effectiveness. Supposed that surgeons did not removed varices completely, recurrence leaded by residual vein intended to happen in short period.[11,12] Hence, no significant difference in recurrence revealed that surgical effectiveness in DS and IS group is nearly the same. In another word, surgical effectiveness was retained equally in DS and IS group.

From a superficial view, it was concluded that patients in DS group (780.33 dollars) cost much less than in IS group (1021.06 dollars), which was just beneficial for patients. Yet on the other hand, when investigating into the monochloropropanediol (MCPD) for isolated limb, it revealed that MCPD in DS group was 780.33 dollars, but 255.27 dollars in IS group. That was a big gap with respect to revenue of hospital. The more important was limited medical resource distributing in of efficiency way on the condition that surgical effect in DS and IS group was equal. In a same interval, far more patients in ASC, about 4 times as many as that in inpatient ward, could underwent GSVV surgery and got rid of it.

ASC was the right place for GSVV. AS we knew, GSVV was one of common chronic venous disease. The overall pathologic process included varices, edema, skin change, and ulceration, which influence about 40% population.[13] High ligation and stripping adopted in our hospital was a developed, standardized, simple, and minimally invasive procedure, which was beneficial for patients' recovery after surgery.[14,15] Taking amount of patients and simple surgical procedure into consideration, ASC was the idealized place for GSVV patient. Because it was in ASC, surgeons could resolve many common surgical diseases through simple and effective procedure.[16]

Standardized issue was the crucial point to affect quality of GSVV surgery in ASC, which included not only standardized staffing (surgeon, anesthetist, and nurse) and preoperative examination and postoperative follow-up, but a standardized surgery process.[17] Only when each detail of GSVV procedure in ASC was standardized, which was the same with inpatient one, quality of GSVV surgery could be guaranteed.[4] In our hospital, all surgery-related faculties (surgeons, nurses, and anesthetists) in ASC were the same group working in inpatient operation room. Furthermore, the whole plan of GSVV surgery (from preoperative examination to surgery to postoperative management and follow-up) has been identified for more than 10 years. Moreover, the result in the study showed bilateral varicose vein surgery could be performed in ASC safely without risk of complications increasing. This tendency was similar with Gemayel's and Rivlin's results.[18,19]

Conclusion

The present study has approved that DS was an effective way for GSVV patients. It greatly lowered the medical cost for each patient, and increased revenue for hospital. Moreover, GSVV surgery in ASC made medical resource distribute more effective than usual, which was worthy to be promoted in other kinds of common surgical disease and hospital, even other locations.

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Conflicts of interest
There are no conflicts of interest.

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