




Comparative Results in Bilateral Carpal Tunnel Surgery in 1 and 2 Stages

Resultados comparativos en cirugía del túnel carpiano bilateral en 1 y 2 etapas

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Abstract

Introduction Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, with 3-5% and 50-70% being bilateral. It is believed that intervening simultaneously in 1 stage is associated with greater discomfort than in 2 stages and is associated with high costs for both the patient and the health systems.

Hypothesis Bilateral carpal tunnel surgical treatment in 1 stage is well tolerated, with similar postoperative evolution time and lower cost.

Methods Retrospective cohort study. Review of bilateral CTS files operated in 1 and 2 stages in 1 center, by the same team, between 2019-2022, follow-up 2 and 41 months. Interthenar open surgical technique.

It evaluated: absenteeism, Quick Dash, satisfaction, and costs. It considered the average income in Chile published by the National Institute of Statistics (INE) 2020 for the valuation of lost workdays (LWD). For the valuation of the cost of intervention, a quote for both surgical modalities were requested from the medical center in June 2022. For cost analysis, the conversion of Chilean pesos to dollars was carried out. An Excel spreadsheet was used to compare the means of the 2 groups for the different parameters recorded with a significance level P of 0.05.

Results Of 538 surgeries performed at the medical center in the period analyzed, 118 were found to meet inclusion and exclusion criteria:

Group A: bilateral intervention in 1 stage. 26 patients, corresponding to 52 interventions. Average age 49.

Keywords

- ▶ carpal tunnel
- ▶ surgical treatment
- ▶ cost analysis

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Group B: bilateral intervention in 2 stages. 33 patients, corresponding to 66 patients. Average age 49.

Quick DASH group A v/s B average 1.74 v/s 3.23 p value 0.47. LWD 32.88 v/s 84.84; P value 0.00014. Satisfaction 88% vs. 91%, p 0.69. Surgical expense incurred was 4979.37 US v/s 5274.63 US

Considering the LWD difference was US 1503.26

Conclusion Surgical result is comparable without major discomfort. There was a significant difference in lost workdays and costs, favoring intervention in 1 stage.

Level of evidence III

Resumen

Introducción Síndrome túnel carpiano (STC) es la neuropatía por atrapamiento más frecuente, correspondiendo 3-5%¹ 50-70% es bilateral.² Se cree que intervenir simultáneamente en 1 tiempo se asocia a mayor discomfort que en 2 tiempos, se asocia a elevado gasto tanto para el paciente como para los sistemas de salud.³

Hipótesis Tratamiento quirúrgico en 1 tiempo es bien tolerado, con tiempo de evolución postoperatorio similar y menor costo.

Métodos Estudio retrospectivo de cohorte. Revisión archivos de STC bilateral operados en 1 y 2 tiempos en 1 centro, por mismo equipo entre 2019-2022, seguimiento 2 y 41 meses. Técnica abierta intertenar.

Evaluó: ausentismo laboral, Quick Dash, satisfacción y costos. Consideró ingreso promedio en Chile publicado por Instituto Nacional Estadísticas (INE) 2020 para valorización día laboral perdido (DTP).

Resultados 538 cirugías se rescataron 118:

Grupo A: intervención bilateral en 1 tiempo. 26 pacientes. Edad promedio 49.

Grupo B: intervención bilateral en 2 tiempos. 33 pacientes. Edad promedio 49.

Quick DASH grupo A v/s B promedio 1.74 v/s 3.23 valor p 0.47. DTP 32.88 v/s 84.84; valor p 0.00014. Satisfacción 88% v/s 91%, p 0.69. Gasto incurrido quirúrgico fue 4979.37 US v/s 5274.63 US

Considerando DTP diferencia fue de US 1503.77

Conclusión Resultado quirúrgico es comparable sin mayor discomfort. Existió diferencia en días laborales perdidos y costos favoreciendo intervención en 1 tiempo.

Nivel evidencia III

Palabras clave

- ▶ túnel carpiano
- ▶ tratamiento quirúrgico
- ▶ análisis de costos

Introduction

Carpal tunnel syndrome (CTS) corresponds to the most reported peripheral entrapment neuropathy, corresponding to 2.7%.¹ 50-70%² of patients present symptoms bilaterally. Women are 3 times more affected than men. Obesity, diabetes mellitus, thyroid disorders, rheumatoid arthritis, previous wrist fractures, and pregnancy are well-established risk factors. The symptoms observed correspond to paresthesias, hypoesthesia, and pain, especially at night. If conservative treatment fails, surgical release is performed through retinaculotomy.

Surgical treatment is associated with high financial costs for both the patient and the health systems to which they belong, lost workdays, discomfort, and inability to use the hand presented by patients operated on for bilateral carpal tunnel syndrome in both 1 and 2 stages.

It is believed by hand surgeons that the simultaneous intervention of both extremities at one stage entails greater discomfort and disability for activities of daily living than those operated on in 2 stages.¹⁻³

A study carried out by Weber et al.¹ evaluated costs, recovery, and days, lost recommending release in 1 stage.

We propose that 1-stage surgical treatment can be well tolerated,⁴ with a similar postoperative evolution time and lower financial cost^{3,5,7,8} than 2-stage surgery.

Methods

Retrospective cohort study

The clinical records were reviewed to obtain epidemiological data from patients who underwent surgery for bilateral CTS, performed in 1 or 2 stages at a single center by the same surgical team between January 2019 and

May 2022. No work compensation was involved. Phone numbers were obtained, along with information on days of work leave and/or absence from regular activities for those who were retired; a subsequent telephone survey was conducted.

Inclusion criteria: Patients with bilateral CTS operated on at the same center by the same surgical team between January 1, 2019, and May 30, 2022, who could be reached by phone during July 2022 and explicitly agreed to participate in the study.

Exclusion criteria: Patients with recurrent carpal tunnel, not reachable by telephone or who refused to participate in the study, and those who did not complete the surveys or follow-up.

The patients were distributed into different groups according to their personal preference for surgical treatment in 1 or 2 stages:

- Group A: surgical intervention of both hands in 1 stage.
- Group B: surgical intervention of both hands in 2 stages.

The surgical technique involved a mini-open release of the retinaculum, 1.5–2 cm in length, performed in the interthe-nar crease.⁹ The hand was subsequently covered with a soft dressing. One-week post-intervention, dressing changes were performed, replacing it with a small dressing, and patients were encouraged to mobilize their hands for light activities. The sutures were removed 14 days post-surgery. No follow-up physiotherapy sessions or complications were recorded.

The study evaluated days of absenteeism from work and/or absence from usual activities in retired individuals based on clinical records, the Quick DASH,⁷ and the degree of user satisfaction through a telephone survey conducted in May 2022 for all patients included in the study. The time between surgery and the survey ranged from 2 to 41 months. Costs associated with the surgical intervention were

assessed through a formal quote provided by the institution in June 2022 for 1 and 2-stage outpatient carpal tunnel surgery. (Attachment) The valuation of the LWD was calculated using the average income in Chile for the year 2020, published by the National Institute of Statistics (INE),⁹ which corresponds to 635,134 Chilean pesos. For cost analysis, Chilean pesos were converted to US dollars.

For data analysis, an Excel spreadsheet was used, and a Student's t-test was applied to compare the means of the two groups across different parameters, with a significance level set at $P \leq 0.05$.

Results

Of a total of 538 surgeries performed at the medical center by the surgical team between January 1, 2019, and May 30, 2022, 94 patients who corresponded to those operated on for bilateral carpal tunnel were analyzed, of which 59 met the inclusion and exclusion criteria participated, corresponding to 118 surgeries performed, distributed as follows:

Group A: Included 26 patients, with 19 females and 7 males. The age range was 24 to 71 years, with an average of 49 years. The average Quick DASH score was 1.74 (range 0–22.72) (►Chart 1). The average number of lost workdays was 32.88 days (range 14–60) (►Chart 2). Regarding satisfaction after the surgical intervention, 88.4% (23 patients) reported being fully satisfied, and 11.6% (3 patients) were moderately satisfied (►Chart 3). When asked if they would recommend undergoing surgery on both hands in a single stage, 88.4% (23 patients) responded favorably, and 11.6% (3 patients) said "maybe." If they needed surgery again, 96.15% (25 patients) would do it, and the same percentage agreed that the surgery improved their quality of life. The cost of the surgical intervention was \$4,979.37 (►Chart 4), with an additional \$765

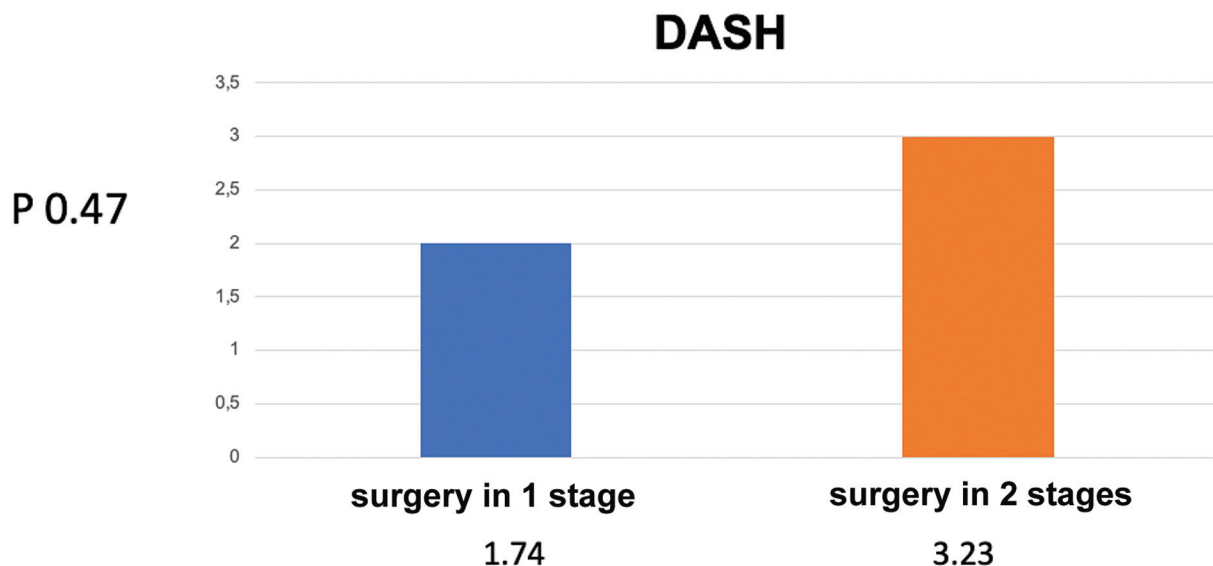


Chart 1 Quick DASH carpal tunnel surgery 1 and 2 stages.

Lost workdays

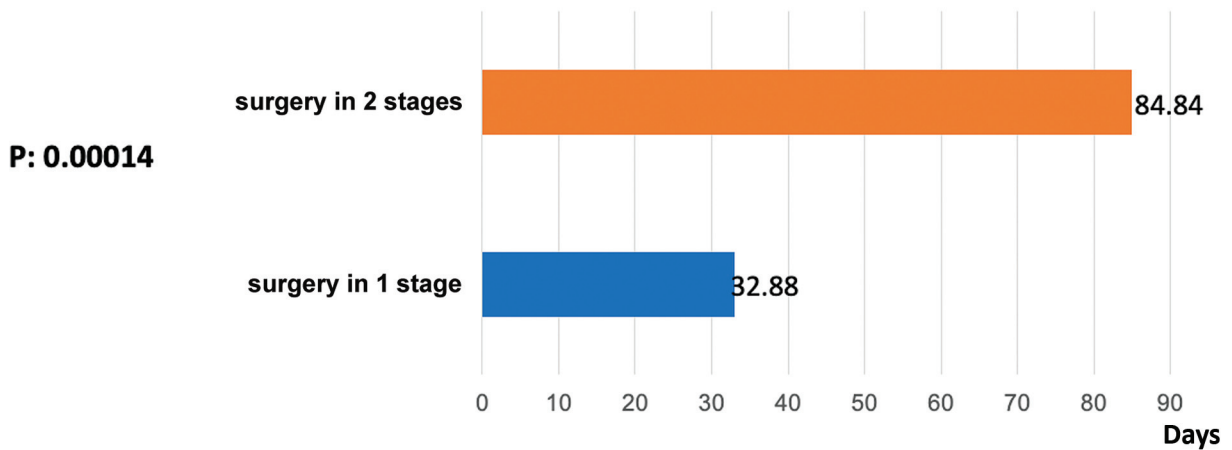


Chart 2 Lost workdays in bilateral carpal tunnel surgery in 1 and 2 stages.

incurred per lost workday (►Table 1), resulting in a total cost (surgery plus LWD) of \$5,744.37.

Grupo B: Included 33 patients, with 20 females and 13 males. The age range was 33 to 71 years, with an average of 49 years. The average Quick DASH score was 3.23 (range 0–50) (►Chart 1). The average number of lost workdays was 84.84 days (range 28–196) (►Chart 2). Regarding satisfaction after the surgical intervention, 91% (30 patients) reported being fully satisfied, and 9% (3 patients) were moderately satisfied (►Chart 3). When asked if they would recommend undergoing surgery in two stages, 100% of patients responded affirmatively. If they needed surgery again, 94% (31 patients) would do it, and 97% (32 patients)

agreed that the surgery improved their quality of life. The cost of the surgical intervention was \$5,274.63 (►Chart 4) with an additional \$1,973 incurred per lost workdays (►Table 1), resulting in a total cost (surgery plus LWD) of \$7,247.63.

Discussion

There were no significant differences in the Quick DASH result with a p-value of 0.47 between both groups, which suggests that the final result of surgical intervention was the same for both groups; although there is a time bias between the performance of surgery and the completion of the

Surgical intervention satisfaction

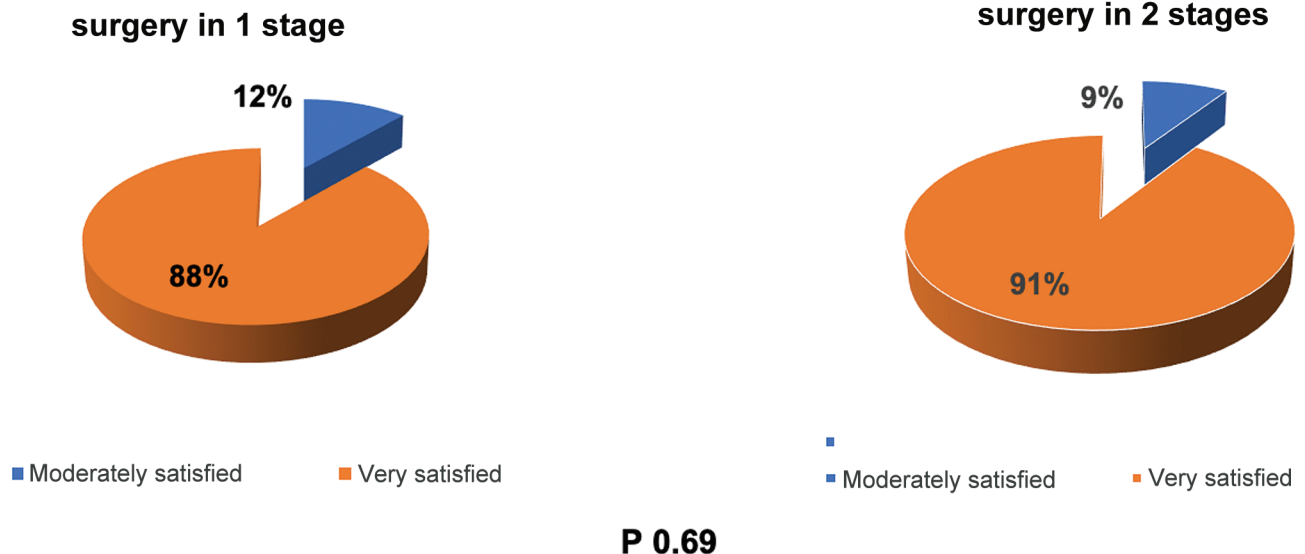


Chart 3 Patients' satisfaction after bilateral carpal tunnel surgery in 1 and 2 stages.

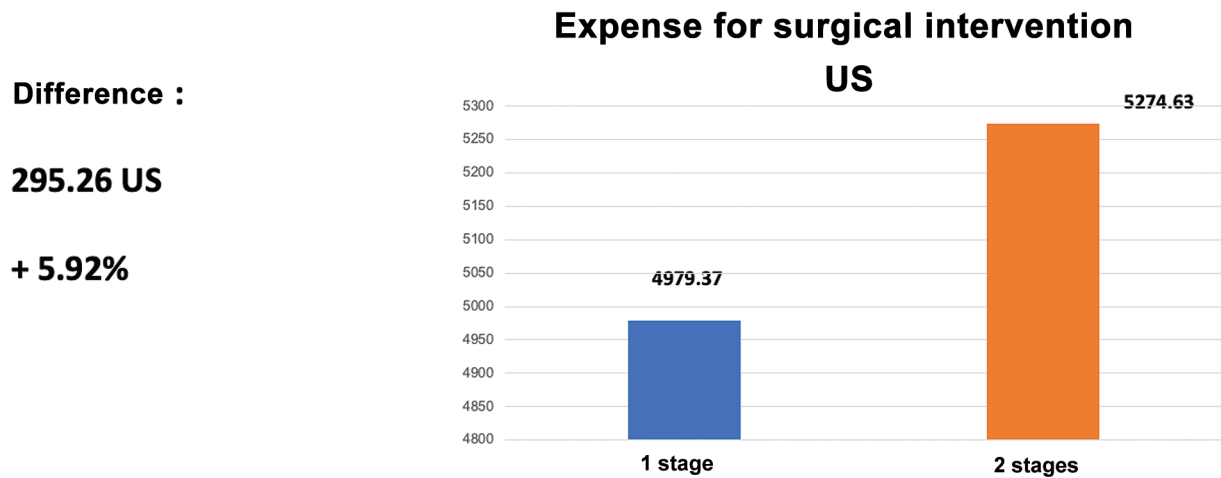


Chart 4 Expense per surgical intervention in bilateral carpal tunnel surgery in 1 and 2 stages.

telephone survey with a period between 2 and 41 months, the dispersion being similar for both groups.

The evaluation of recommendations to other people to undergo surgery in 1 or 2 stages does not have a statistically significant difference with a p-value of 0.083.

In relation to the degree of satisfaction after surgery, there is no significant difference with a p-value of 0.69 for this variable (► **Chart 3**).

When asked if this surgery improved their quality of life, there is no significant evidence between both groups with a p value of 0.86; and if the procedure was performed again, there was no difference between both groups with a p value of 0.69.

In relation to the lost workdays due to surgeries in Group A vs Group B, the result is statistically significant with a p-value of 0.00014, which confirms our hypothesis that having surgery in 1 stage significantly reduces the number of lost workdays (► **Chart 2**), this could be explained with the fact that when the patient has one hand operated on, he waits for at least a period of time in which he remains at rest and then the second limb is operated on, adding this rest time to the previous one, a situation that occurs simultaneously in the case of both limbs being operated on in a single surgical procedure.

The economic savings in relation to the expense incurred for surgery is lower, corresponding to US 295.26 (► **Chart 4**),

but when considering the lost workdays (► **Chart 5**) plus the difference in the cost of the surgical intervention, this amount rises to US1,503 .26, which corresponds to a difference of 26.17% in favor of intervention in 1 stage (► **Chart 6**)

Conclusion

This study shows that the final outcomes of surgical intervention for carpal tunnel syndrome, whether performed in 1 or 2 stages, are comparable in terms of Quick DASH scores, without significant differences in postoperative discomfort, as indicated by the patients' evaluations of the final results. However, there is a statistically significant difference in the number of lost workdays following surgical interventions, which translates into higher economic costs for the patient's insurance system in 2 stage surgeries. Based on this analysis, the authors recommend performing bilateral CTS surgery in one stage, as it does not present significant disadvantages for patients. It is important to acknowledge that the main limitation of this study is the retrospective collection of cases, a relatively small number of participants, and the administration of the DASH questionnaire long after the surgery in some instances. Future challenges include conducting a prospective study to analyze potential complications associated with one- and two-stage

Table 1 Summary of results

	No	Age Years	Quick DASH	LWD*	Satisfaction	Surgical costs US	LWD expenditure US	Total expenditure Surgery+ LWD US
Group A Surgery in 1 stage	26	24-71 X 49	2.27-22.72 (X 1.7)	14-60 (X 32.88)	88.4%	4979.37	765	5744.37
Group B 2 stage surgery	33	14-60 X 49	2.27-50 (X 3.23)	28-196 (84.84)	91%	5274.63	1973	7247.63

*Lost workdays.

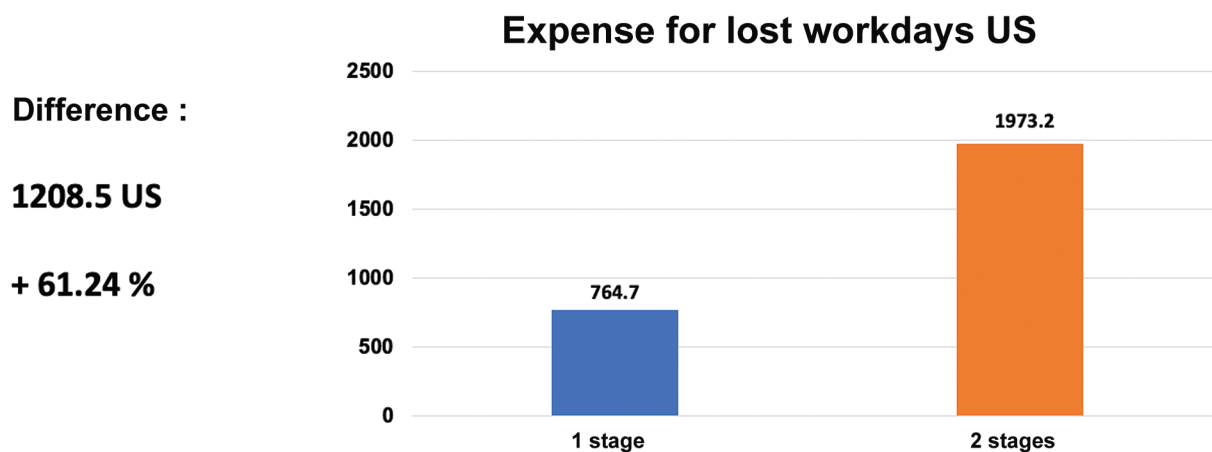


Chart 5 Expense for lost workdays in bilateral carpal tunnel surgery in 1 and 2 stages.

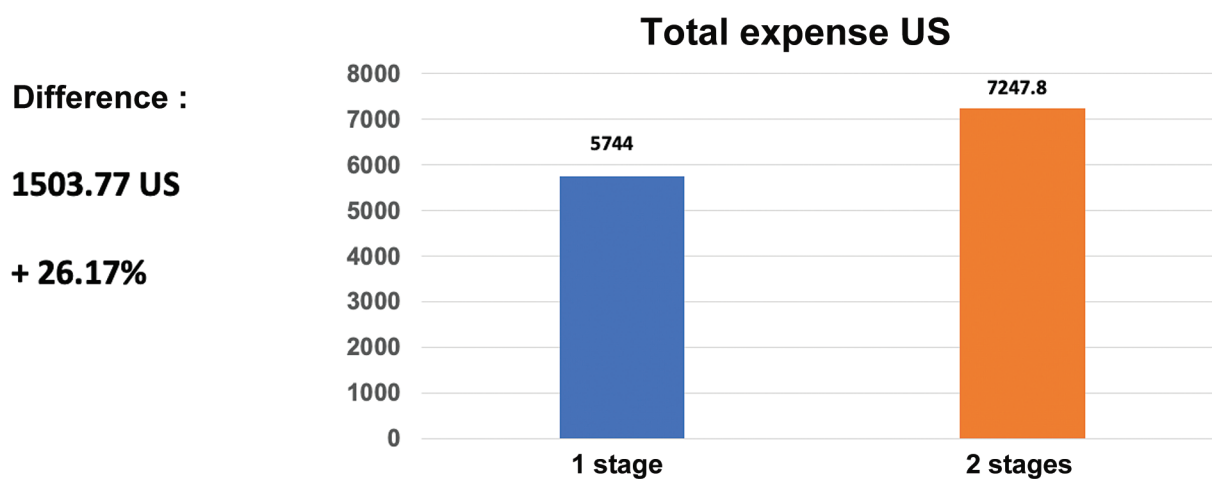


Chart 6 Difference in total expenditure in carpal tunnel surgery in 1 and 2 stages.

surgeries, as well as considering the type of work performed by the patient.

Conflict of interests
None.

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