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Comparison of Quality of Life Using Chronic Venous Insufficiency Questionnaire (CIVIQ) and Factors Affecting It in Chronic Venous Insufficiency Patients After Endovenous Microwave Ablation with High Ligation + Stripping

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Abstract:
The prevalence of Chronic Venous Insufficiency (CVI) continues to increase globally, with approximately 30-40% of the adult population experiencing varicose veins as an early manifestation of venous insufficiency. To date, there are few studies that compare endovenous microwave ablation (EMA) with conventional management of high ligation and stripping (HLS) in terms of quality of life in CVI patients. This study aimed to assess the difference in quality of life of post-operative CVI patients using the CIVIQ-20 questionnaire, by comparing patients who were treated with EMA versus HLS. This prospective cohort study involved 40 CVI patients from RSCM, Hermina Bekasi Hospital, and Hermina Depok Hospital in the May-June 2025 period. Data was collected using questionnaires. Bivariate analysis with Chi-Square test, Fischer's exact test, Independent T-test, and Mann-Whitney U test. Overall, the mean change (Δ) of CIVIQ score for EMA vs. HLS was 12.82 ± 6.97 vs. 14.33 ± 6.78 ($p = 0.334$). In patients ≥ 60 years of age, the Δ CIVIQ score for HLS vs. EMA was 16.17 ± 5.67 vs. 10.89 ± 2.67 ($p = 0.029$). In female patients, the Δ CIVIQ score for HLS vs. EMA was 16.63 ± 5.32 vs. 10.23 ± 4.21 ($p = 0.006$). No significant difference in Δ CIVIQ score between HLS and EMA was found in patients < 60 years of age, male, or patients with obesity compared to normoweight. In 60≥year-old CVI patients and female CVI patients, management with HLS resulted in a significantly higher CIVIQ-20 Δ score than EMA. This showed a better quality of life in both groups of patients when treated with HLS.

Keywords: endovenous microwave ablation, high ligation and stripping, CIVIQ-20, quality of life, chronic venous insufficiency

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INTRODUCTION

Chronic Venous Disease (CVD) is a disorder of the venous system due to venous valve incompetence that can involve superficial, deep, or both-venous veins. One specific form of CVD is Chronic Venous Insufficiency (CVI), which is a condition in which the venous valves do not function optimally, causing venous backflow to be disrupted. CVI can cause symptoms such as edema, skin changes, and ulcers that are difficult to heal and greatly affect the patient's quality of life.

Chronic venous disease (CVD) is a common condition that can cause significant symptoms in the advanced stages and is at risk of causing complications such as leg venous ulcers (Santler & Goerge, 2017). The main cause of chronic venous insufficiency (CVI) is varicose veins in the lower extremities, which in severe conditions can develop into venous ulcers. It is estimated that 30–40% of the adult population has varicose veins, and about 6% of them are at risk of developing venous ulcers throughout their lives. As many as 30% of varicose veins can also develop into a more severe form of CVI. The prevalence of active venous ulcers

in the general population ranges from 0.1–0.3%, with the incidence of varicose veins estimated to reach 2% per year. Congenital abnormalities of the venous valves also play a role in the pathogenesis of varicose veins (Eberhardt & Raffetto, 2014; Santler & Goerge, 2017).

According to the Framingham Heart Study, the incidence of varicose veins within two years was 2.6% in women and 2.0% in men. CVI can be primary (70% of cases) or secondary (30%). Venous ulcers, as the most severe complication of CVI, affect 1–2% of the elderly population and have a significant impact on quality of life and pose a significant economic burden. In the United States, about 2.5 million people suffer from CVI and 20% of them have venous ulcers. The prognosis of venous ulcers is generally poor, due to slow healing and high recurrence rates. The socio-economic burden of venous ulcers is significant—including loss of work and social activities, decreased productivity, and increased risk of early retirement, which reportedly affects more than 12% of working patients with the condition. Venous ulcers are even estimated to cause a loss of about 2 million working days each year (Eberhardt & Raffetto, 2014).

The prevalence of CVI continues to increase globally. About 30–40% of the adult population experiences varicose veins as an early form of venous insufficiency, and about 1% develop chronic venous ulcers. This condition has a significant socio-economic impact due to high maintenance costs and decreased work productivity. The quality of life of CVI patients is now an important indicator of the success of therapy (Eberhardt & Raffetto, 2014; Santler & Goerge, 2017). One of the widely used measurement tools is the Chronic Venous Insufficiency Questionnaire (CIVIQ), specifically the 20-item version (CIVIQ-20), which assesses the impact of CVI on physical, pain, psychological, and social aspects (Launois et al., 2010). CIVIQ-20 has been validated in Indonesia and is commonly used to evaluate various CVI treatment methods, including surgery, stenting, compression therapy, pharmacotherapy, and ablation (Darwis et al., 2024).

A wide range of CVI therapy options are now available, ranging from conservative (compression stockings, medicaments) to invasive interventions (Eberhardt & Raffetto, 2014; Santler & Goerge, 2017). Conventional surgical treatments such as High Ligation and Stripping (HLS) aim to remove insufficient veins and prevent venous reflux. This procedure effectively lowers symptoms and improves quality of life. However, the emergence of the Endovenous Microwave Ablation (EMA) technique as a minimally invasive thermal ablation is becoming a promising new alternative due to its high efficacy, low complications, and fast recovery. Studies by Yang et al. show that the EMA has an occlusion rate of up to 97–99% in 6–12 months with lower recurrence than HLS (Zhao et al., 2024).

In general, clinical manifestations in CVI can be classified based on Clinical, Etiology, Anatomical, Pathophysiology (CEAP) (table 1), which was developed through an international consensus conference to create uniform standards in the reporting, diagnosis, and management of chronic venous insufficiency (CVI). The clinical classification in this system consists of 7 categories (0–6) and is further differentiated based on the presence or absence of symptoms (Gloviczki et al., 2011).

Table 1. CEAP Classification.[8]

CEAP Classification
Clinical classification
C_0 No visible clinical symptoms
C_1 Telangiektasis or vena retikuler
C_2 Varicose vein
C_3 Edema
C_4 Changes in skin and subcutaneous tissue
A Pigmentation and eczema
B Lipomatosclerosis or atrophy
C_5 Healing ulcers
C_6 Active ulcers
Etiological classification (E)
E_c Congenital
E_p Primer
E_s Secondary
E_n Unidentified
Anatomical classification (A)
A_s Superficial
A_d Internal
A_p Perforator
A_n Unidentified
Pathophysiologic classification (P)
P_r Reflux
P_o Obstruction, Thrombosis
$P_{r,o}$ Reflux and obstruction
P_n No pathophysiology identified

Source: Quoted and adapted from Gloviczki et al. (2011)

The diagnosis of CVI begins with an anamnesis, in which patients often complain of heaviness, soreness, swelling, itching, or cramping in the legs, especially after standing for a long time, and usually improve when the legs are lifted. Risk factors such as a history of varicose veins, DVT, pregnancy, obesity, long standing, and a history of leg trauma need to be considered.

Physical examinations are performed while the patient is standing to assess visual signs such as telangiectasis, varicose veins, edema, hyperpigmentation, lipodermatosclerosis, and venous ulcers, especially around the maleolus medialis. The CEAP classification is used to determine the severity, from C0 (no marking) to C6 (active ulcer) (Eberhardt & Raffetto, 2014; Santler & Goerge, 2017).

The diagnosis is established through a supportive examination. Duplex ultrasound is the gold standard in CVI evaluation, as it can assess the direction of blood flow, detect reflux, and spot obstructions. Reflux is said to be significant when the duration is >0.5 seconds in the superficial vein or >1 second in the deep vein. Additional examinations such as aerial plethysmography are useful for assessing venous capacity and the effectiveness of leg muscle pumping. Venography with contrast is used when deep vein obstruction is suspected, while

intravascular ultrasound (IVUS) helps visualize large venous lesions that are difficult to reach by regular ultrasound, especially in the pelvic area (Santler & Goerge, 2017).

For the past few decades, HLS has been the gold standard in the treatment of varicose veins due to venous insufficiency. This procedure involves the severance of the sapheno-femoral and/or sapheno-popliteal connection, with or without superficial vein removal, usually performed under general or spinal anesthesia. However, this method has a number of drawbacks, including the need for hospitalization, the risk of wound complications, neovascularization that can lead to recurrence, as well as longer recovery (Eberhardt & Raffetto, 2014).

As medical technology develops, varicose vein management is now shifting to minimally invasive interventions, such as endovenous ablation, which are considered safer, more comfortable, and effective. This procedure uses a catheter to destroy the venous endothelium and stimulate fibrosis, so that the veins close and blood flow returns to normal. This method provides the advantages of minimal postoperative pain, faster recovery time, and a much lower complication rate compared to conventional surgery (González Cañas et al., 2021).

A large-scale study in São Paulo, Brazil, analyzed 66,577 acts of stripping in 11 years. The majority of patients were women aged >40 years, and an increasing trend was found in unilateral procedures, which may reflect a preference for milder procedures. Although it is an invasive procedure, the inhospital mortality rate is very low (0.0045%). Nevertheless, its financial burden remains a concern for the public health system (da Silva et al., 2022).

Another study comparing Radiofrequency Ablation (RFA) with conventional high ligation and stripping involved 110 patients and showed that although the action time of RFA was slightly longer, the clinical outcomes were much better. RFA patients experienced less pain, returned to activity more quickly (79% within five days compared to 40% in the HLS group), and had a lower risk of complications such as bruising and sensory disturbances. These findings confirm a shift in preferences towards safer and more convenient endovenous methods, particularly for patients who want a quick recovery with minimal risk (Fan et al., 2022).

In recent years, minimally invasive techniques such as Endovenous Microwave Ablation (EMA) have begun to replace traditional surgical procedures for the treatment of varicose veins. EMA is a relatively new method compared to RFA and is widely used in the field of oncology. Unlike RFAs that use thermocouples to control temperature, EMAs generate heat internally with a frequency of 2,450 MHz, which triggers the polar molecular movement of vascular tissue, generates heat, and closes veins through coagulation and fibrosis processes (Yang et al., 2024).

A number of studies show that EMAs have a high technical success rate. The study by Yang et al. reported an occlusion rate of 99% at 6 months and 97% at 1 year, with a lower recurrence rate than HLS (14.3% vs. 28.2%). This demonstrates the potential of EMA as a superior alternative for long-term management of venous insufficiency (Yang et al., 2013).

In terms of safety, EMAs have a relatively low complication profile compared to surgical procedures, such as bleeding and nerve injury. However, compared to EVLA and RFA,

EMAs have a tendency to cause certain side effects. Mao et al. reported lower eczemosis at EMA than at EVLA (17.4% vs. 21.5%), but skin burns and paresthesia were more common (Mao et al., 2012). Zhao et al. also noted higher levels of hyperpigmentation at the EMA (32.31% vs. 13.04% at RFA), although it mostly improved within 12 months (Zhao et al., 2024).

Another study by Subwongcharoen et al. (2014) noted that the EMA resulted in a total occlusion of 79.8%, and an additional 8.7% of patients experienced partial occlusion without reflux, which overall showed significant clinical benefit. Evaluation with a CIVIQ-20 score showed an improvement in quality of life, with a decrease in score from 32 to 24 ($p < 0.001$). However, the EMA also has side effects such as temporary numbness (32.1%), permanent (3.8%), ecchymosis (22.1%), skin discoloration (12.5%), burns (5.8%), and thrombophlebitis (3.8%). However, there have been no reports of DVT cases or pulmonary embolism, confirming that EMA remains a safe procedure compared to other invasive methods (Zhao et al., 2024).

The Chronic Venous Insufficiency Quality of Life Questionnaire (CIVIQ) is a special measurement tool used to assess the impact of CVD on a patient's quality of life, particularly in physical, psychological, social, and pain aspects. Developed by Launois et al. in 1996, the tool has undergone cross-cultural validation and resulted in two main versions: CIVIQ-20 and a condensed version of CIVIQ-14 (Le Moine et al., 2016; Biemans et al., 2011). CIVIQ-20 has 20 questions with four main dimensions, using a 5-point Likert scale, where higher scores reflect a poorer quality of life. This version showed high internal consistency (Cronbach's alpha > 0.80) and good validity for assessing the effectiveness of therapy. Meanwhile, CIVIQ-14 is focused on three key dimensions – pain, physical, and psychological – for ease of use in clinical practice, while still demonstrating solid reliability and validity. CIVIQ generally has high retest reliability (>0.80), good construct validity, and is able to differentiate patients based on CEAP classification (C0–C6) (Launois et al., 2010).

A recent validation study by Darwis et al. adapted CIVIQ-20 into Indonesian. This study was conducted at Cipto Mangunkusumo Hospital on 40 CVI patients aged 18–65 years. The results showed that the CIVIQ-20 in the Indonesian version was easy to use, with an average charging time of 8 minutes, 100% response, and excellent internal consistency ($r = 0.91$). However, two items – feelings of shame and alertness – had a low validity score ($r < 0.3$), signaling the need for refinement in cultural or translational aspects. CIVIQ is now widely used in clinical trials, epidemiological studies, and clinical practice as a Patient-Reported Outcome Measure (PROM) to support clinical decision-making and disease monitoring.

However, in Indonesia, access to EMA is still limited due to BPJS' financing policy. Type A hospitals such as RSCM can provide EMA for all classes of BPJS participants, but in type B hospitals such as Hermina Depok and Bekasi, EMA actions are only covered for classes 1 and 2. Meanwhile, grade 3 patients receive HLS more often due to cost and equipment limitations.

Although many studies have compared the efficacy and complications of EMA with HLS, very few studies have specifically assessed the comparison of quality of life of CVI patients after the procedure, especially in the context of the healthcare system in Indonesia. In fact, quality of life is an important outcome that reflects clinical success as well as patient

satisfaction. Therefore, this study aims to assess the difference in quality of life of CVI patients after EMA and HLS action using the CIVIQ-20 instrument. The results of this study are expected to provide evidence and clinical considerations for medical personnel and policymakers in choosing therapy modalities that are not only technically effective, but also the best in improving the quality of life of patients, especially for certain subgroups of the population such as women and the elderly.

RESEARCH METHOD

This study used a prospective cohort design using primary data from CVI patients who were treated at RSCM, Hermina Bekasi Hospital, and Hermina Depok Hospital from May 2025 to June 2025 and managed using EMA or high ligation + stripping. Evaluation of the results of the study, in the form of CIVIQ-20 scores collected preoperatively and 1 month postoperatively. The target population is all CVI patients undergoing EMA or HLS surgery. Quality of life data as a dependent variable were collected using the CIVIQ-20 questionnaire in Indonesian which was filled out by patients at pre-operative and postoperative one month. Data were analyzed using SPSS version 26.0 with parametric (Independent T-test) and non-parametric (Mann-Whitney U test, Chi-Square, Fisher's Exact Test) statistical tests to compare the difference in change (Δ) of CIVIQ-20 score between the two action groups, with the statistically significant level set at $p < 0.05$

RESULTS AND DISCUSSION

In the initial recruitment, there was a sample of 40 patients. There were 25 (62.5%) patients aged <60 years and the majority (52.5%) were women. Generally, patients with obesity (28 patients or 70%). There was a decrease in CIVIQ-20 scores in the post-operative period compared to pre-operatively, by 26.3 ± 3.44 and 92.2 ± 4.29 compared to 39.8 ± 8.9 and 75.4 ± 11.15, respectively. There were no significant differences between the EMA and HLS groups in demographic and clinical characteristics. The demographic and clinical characteristics of patients can be seen in table 2.

In the overall patient data, the results of the Mann-Whitney test showed that Δ the CIVIQ EMA score was not significantly different from the HLS (p=0.334) even though the CIVIQ-20 HLS score Δ was higher than the EMA. (Table 3).

In the ≥ age group of 60 years, the results of the Independent T-test showed that the Δ CIVIQ HLS score was significantly higher by 5.28 points compared to the EMA (p=0.029). In the < age group of 60 years, the results of the Mann-Whitney test showed that the Δ CIVIQ HLS score was not significantly different from the EMA (p=0.957). (Table 4).

Table 2. Demographic and clinical characteristics of patients

Characteristics	Action Type		Total (n=40)	P value
	EMA (n=22)	HLS (n=18)		
Age, mean ± elementary school	59.09 ± 11.96	55.61 ± 9.17	57,52 ± 10,80	0,317#
Age, median (min-max)	56 (39-83)	54,5 (38-73)	55,5 (38-83)	-
Age, n (%)				0,747$
≥60 years old	9 (40,9)	6 (33,3)	15 (37,5)	
<60 years old	13 (59,1)	12 (66,7)	25 (62,5)	
Gender, n (%)				0.525^
Man	9 (40,9)	10 (55,6)	19 (47,5)	
Woman	13 (59,1)	8 (44,4)	21 (52,5)	
High, mean ± SD	161,23 ± 8,89	162,28 ± 11,54	161,7 ± 10,05	0,567$
Weight, red ± SD	73,38 ± 20,02	73,1±11,32	73,26 ± 16,48	0,958#
BMI, n (%)				0,315$
Obesity	17 (77,3)	11 (61,1)	28 (70)	
Normal	5 (22,7)	7 (38,9)	12 (30)	
CIVIQ-20 pre-operation, mean ± SD	38,18 ± 8,99	41,78 ± 8,61	39,8 ± 8,9	0,207#
CIVIQ-20 post operation, mean ± SD	25,36 ± 3,58	27,44 ± 2,97	26,3 ± 3,44	0,056#

#Independent T-test, significant if p<0.05
$Mann-Whitney-U test, significant if p<0.05^Chi-Square test, significant if p<0.05

Source: Data processed from primary research results (2025)

Table 3. Differences between Delta CIVIQ pre- and post-operative EMA and HLS as a whole

Characteristics	Δ CIVIQ		Mean Difference	P value
	EMA (n=22)	HLS (n=18)		
Overall patients	12,82 ± 6,97	14,33 ± 6,78	-1,52	0,334 $

#Independent T-test, significant if p<0.05
$Mann-Whitney-U test, significant if p<0.05

Source: Data processed from primary research results (2025)

Table 4. Differences in Delta CIVIQ pre- and post-operative EMA and HLS by age

Characteristics	Δ CIVIQ		Mean Difference	P value
	EMA (n=22)	HLS (n=18)		
Age ≥ 60 years old	10,89 ± 2,67	16,17 ± 5,67	-5,28	0,029#
Age < 60 years old	14,15 ± 8,69	13,42 ± 7,33	0,74	0,957$

#Independent T-test, significant if p<0.05
$Mann-Whitney-U test, significant if p<0.05

Source: Data processed from primary research results (2025)

In the male group, the results of the Mann-Whitney test showed that the Δ CIVIQ EMA score was not significantly different from the HLS (p=0.201). In the female group, the results

of the Independent T-test showed that the Δ CIVIQ HLS score was significantly higher by 6.39 points compared to the EMA (p=0.006). (Table 5).

In the obesity group, the results of the Mann-Whitney test showed that Δ the CIVIQ EMA score was not significantly different from the HLS (p=0.203). In the *normoweight group*, the results of the Independent T-test showed that Δ the CIVIQ EMA score was not significantly different from HLS (p=0.526). (Table 6).

Table 5. Differences between Delta CIVIQ pre- and post-operative EMA and HLS by gender

Characteristics	Δ CIVIQ		Mean Difference	P value
	EMA (n=22)	HLS (n=18)		
Man	16,56 ± 8,62	12,5 ± 7,52	4,06	0,201$
Woman	10,23 ± 4,21	16,63 ± 5,32	-6,39	0,006#

#Independent T-test, significant if p<0.05
$Uji Mann-Whitney-U, significant if p<0.05

Source: Data processed from primary research results (2025)

Table 6. Difference between Delta CIVIQ pre- and post-operative EMA and HLS based on BMI

Characteristics	Δ CIVIQ		Mean Difference	P value
	EMA (n=22)	HLS (n=18)		
Obesity	14,18 ± 7,32	17,18 ± 6,24	-3,01	0,203$
Normoweight	8,2 ± 2,39	9,86 ± 5,21	-1,66	0,526#

#Independent T-test, significant if p<0.05
$Mann-Whitney-U, significant if p<0.05

Source: Data processed from primary research results (2025)

Chronic Venous Insufficiency (CVI) is a very common condition and often leads to a decrease in quality of life, especially in patients with symptoms such as edema, skin changes, or ulcers. Varicose veins are the most frequent manifestations that progressively decrease the quality of life. The primary goal of CVI management is to improve symptoms and prevent complications such as ulcers, where invasive interventions (such as stripping or ablation) have been shown to be more effective than conservative therapy. However, in developing countries, classic procedures such as high ligation and stripping (HLS) are still more common due to cost and access limitations.

This study aimed to compare the quality of life of CVI patients after EMA and HLS actions using the CIVIQ-20 score. This prospective cohort study involved 40 patients from three hospitals. The results of the analysis showed that overall, there was no significant difference between the improvement in quality of life between the two groups. However, there were significant differences in the subgroup of women and patients ≥ 60 years of age, where HLS gave Δ a higher CIVIQ-20 score than EMA. Given that a lower score indicates better quality of life, a higher Δ in the HLS group indicates a more significant improvement in quality of life than EMA.

These findings are inversely proportional to the study of Huang et al. which reported that the EMA provided better VCSS and CIVIQ scores after 1 year. However, these differences may be influenced by the number of samples, the duration of follow-up, and the methodological approach. Our study was short-term (1 month), while Huang's study had a follow-up of up to 1 year, which allowed for a more comprehensive assessment of physical, psychological, and social changes.

EMA is known as a minimally invasive procedure with a lower risk of complications, shorter hospitalizations, and better cosmetic outcomes. However, HLS may have a more positive emotional impact, especially on the elderly and women. Studies by Santiago et al. show that clinicians often consider the emotional aspect of women more in the management of CVI. This may explain why this group showed better improvement with HLS.

Although the overall quality of life improved post-action in both groups, these results still need to be interpreted with caution. The validity of the CIVIQ-20 questionnaire in the context of Indonesian culture is still limited, and some items are considered less relevant by patients, especially the elderly. Recall bias may also occur because patients are asked to reflect on the condition over the past few weeks.

There were several limitations in the study, including a small sample size, no long-term follow-up, and the lack of important variables such as length of action, complications, cost, and cost-effectiveness analysis. Therefore, follow-up studies with larger sample sizes, longer observation durations, and local validation of quality of life assessment instruments are needed to strengthen these findings.

CONCLUSION

Based on the results of this study, it can be concluded that there is no significant difference in the overall quality of life of Chronic Venous Insufficiency (CVI) patients based on CIVIQ-20 scores in the management of Endovenous Microwave Ablation (EMA) and High Ligation and Stripping (HLS). However, there were significant differences in the ≥60-year-old patient group and female patients, where HLS scored a higher CIVIQ-20 than EMA, indicating better quality of life. Meanwhile, no significant differences were found in CVI patients with obesity. From these findings, it is recommended for operators/clinicians to keep EMA in mind because it has a lower risk (infection, bleeding, hematoma, paresthesia, pigmentation) as well as advantages in surgery duration, length of hospitalization, pain, cost-effectiveness, and recovery of activity, although HLS is more recommended for patients aged ≥60 years and women. For further research, it is recommended to re-validate or substitute the CIVIQ-20 questionnaire to suit the Indonesian context, equalization of the level of education of the sample, increase in sample size to strengthen statistical strength, longitudinal evaluation ≥1 year to examine cost, complications, infection, and duration of hospitalization, and include comprehensive outcome variables such as clinical recurrence, duration of surgery, length of hospitalization, and VCSS score. In addition, the government is expected to provide comprehensive CVI treatment services including HLS and EMA in all state hospitals to reach an estimated 25-40% of female patients and 10-15% of male patients with CVI in Indonesia.

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