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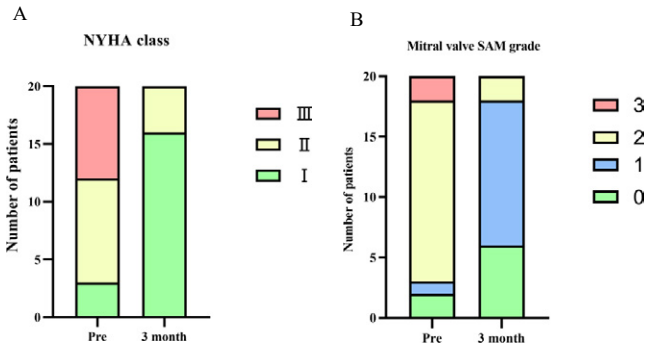

Figure 2: (A): NYHA classification of cardiac before and after ASA. (B): Mitral valve SAM grade before and after ASA.

in the high ventricular septum, leading to an increase in the width of the LVOTD and subsequently improving LVOTO and clinical symptoms [6]. Moreover, as the severity of mitral regurgitation reduces, there is a subsequent decrease in LV end-diastolic pressure decreases, which contributes to a reduction in the size of the LV. This reduction in LV size further decreases the burden of AF and the severity of pulmonary hypertension [7]. The efficacy of the treatment is closely related to the amount of ethanol used during the procedure. Veselka et al determined that a dose of 1.5-2.5 mL of ethanol is the most suitable in terms of safety and effectiveness for periprocedural [8]. Considering long-term safety, it has been demonstrated that ASA with the standard ethanol dose of 3 mL is both safe and effective [9].

Perioperative complications of ASA mainly include AVB and right bundle branch block. The patients are prone to implant permanent dual chamber pacemaker [10]. A significant number of patients with HOCM who undergo ASA closure are at a 9% risk of requiring PPM implantation within 30 days post-ASA [11]. In this study, We did not observed any severe postoperative arrhythmia, which can be attributed to the preoperative implantation of cardiac instruments. Additionally, two patients who had temporary pacemakers implanted in the intraoperation were able to smoothly remove the temporary pacemakers without requiring PPM implantation. Notably, no deaths or severe complications occurred during the perioperative period. During the 6-month follow-up, all patients included in this study reported no symptoms of chest tightness, chest pain, palpitations, shortness of breath, syncope, delayed AVB, or any other complications leading to death. Due to the impact of corona virus disease 2019 (COVID-19) pandemic, most patients underwent echocardiography or cardiac MRI examinations at local hospitals for their 6-months postoperative evaluation. To ensure data reliability, we did not compare data obtained from external hospitals with those collected form our own institution.

SAM is a hallmark feature specific to HOCM. Its initial description dates back to the 1960s [12]. SAM has been observed in 30%-60% of HCM patients [12-14], while in this study, it was observed in 95% of patients. However, there have been reports linking SAM to certain conditions such as acute obstruction of the left coronary artery, mitral valve repair surgery, ventricular septal hypertrophy in hypertensive patients (under conditions of absolute hypovolemia), all of which can lead to LVOTO [15-16]. LVOTO in HOCM is a dynamic and unstable phenomenon that requires comprehensive evaluation [3]. The decision to repeat ASA should be based on a combination of patient symptoms and echocardiography results. Currently, there are three main invasive methods for reducing septum volume in HOCM [17]: ASA, surgical septal myectomy (SSM), and septal radiofrequency ablation. There were no significant differences in all-cause mortality, cardiovascular mortality, and SCD between SSM and ASA [18]. ASA demonstrated advantages in improving NYHA functional class, reducing LVOTG, and lowing the incidence of new AF [19]. Therefore, ASA can be considered as an alternative treatment for mildly symptomatic HOCM patients who are intolerant to SSM. However, compared to SSM, ASA is associated with a higher risk of complete heart block and the need for repeated procedures, among other factors. Researchers at Xijing Hospital introduced the Liwen technique in 2016 for the first time to treat HOCM patients. The Liwen technique is a novel intervention procedure known as percutaneous intramyocardial septal radiofrequency ablation (PIMSRA), which involves guiding a radiofrequency needle through the hypertrophic ventricular septum and using high-temperature radiofrequency (90-100℃) to induce coagulation necrosis in the hypertrophic myocardium. This intervention leads to thinning of the LV septum, thereby reducing LVOTG and improving clinical symptoms [20].

A study involving 244 patients with drug-refractory HOCM found PIMSRA resulted in a reduction of mean maximum septal thickness from 24.0±5.1 mm to 17.3±4.4 mm ($P<0.001$) and a decrease in mean LVOTG from 79.0±53.0 mmHg to 24.0±14.0 mmHg ($P<0.001$). The thirty-day major adverse clinical event rate was 10.5% (n=21), with no reported bleeding events or strokes. These findings suggest that PIMSRA may be an effective procedure for relieving LVOTO and associated symptoms with an acceptable rate of complications [21]. Currently, there are two newly developed targeted drugs, namely mavacamten and aficamten, which belong to the category of small molecule cardiac myosin inhibitors. These drugs have been specifically designed for the treatment of symptomatic patients with HOCM. In terms of regulatory approval, mavacamten received its authorization in the United States during the month of April in 2022. This approval was granted specifically for the treatment of adult patients with symptomatic NYHA functional class II-III HOCM, aiming to enhance both cardiac function and alleviate clinical symptoms [22]. Subsequently, in June 2023, this drug received approval in Europe as well, thereby broadening its scope for the treatment of symptomatic HOCM in adult

patients [23]. Aficamten is being used in phase III clinical trials.

Limitations

This study is a retrospective analysis with a small sample. Due to the impact of the COVID-19 epidemic, the most important limitation of this study is its lack of long-term follow-up, and the subsequent inability to assess the patient's prognosis.

Conclusion

ASA in patients with HOCM is safe and effective for relief of symptoms at short-term follow-up.

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Author Contributions

Conceptualization: Meilian Cai, Data curation: Meilian Cai, Investigation: Meilian Cai, Resources: Yuming Chen, Supervision: Guoqiang Zhong, Writing-original draft: Yuming Chen, Guoqiang Zhong, Writing-review & editing: Meilian Cai

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and clinical protocol was approved by the ethics committee of the First Affiliated Hospital of Guangxi Medical University (2024-E076-01).

Informed Consent Statement: Patient consent was waived due to retrospective nature of the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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