

# Ablation of Right Atrial Flutter in a Sub-Saharan African Country: Experience of Lome (Togo)

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## Abstract

**Introduction:** Atrial flutter is the second most common supraventricular rhythm disorder after atrial fibrillation. Radiofrequency ablation is currently the standard treatment for atrial flutter. **Objectives:** Firstly, to describe the results of radiofrequency ablation of atrial flutter in Lome, and secondly, to quantify the recurrence rate in patients under follow-up. **Methodology:** A descriptive study was conducted from April 2023 to April 2024. Patients with typical atrial flutter on surface ECG who underwent electrophysiological exploration were included. An 8 mm/8 Fr non-irrigated catheter and an Ibi Saint Jude radiofrequency generator were used for ablation. A three-month follow-up was performed after ablation. **Results:** Eleven patients were selected, with a mean age of  $49.78 \pm 12.21$  years. All patients were male. Palpitations were the main symptom (8/11 patients). Hypertension was the predominant aetiology (8/11). The CHA2D2-VA score was  $\geq 2$  in nine cases. An ECG showed flutter in 10 cases and sinus rhythm in one. Rivaroxaban was the most commonly used anticoagulant. Anti-clockwise flutter was the most frequent type identified during electrophysiological examination. The mean procedure duration was  $120 \pm 15$  minutes, with return to sinus rhythm observed in all cases. Bidirectional block was found in ten cases. One patient presented with a point haemorrhage postoperatively. During follow-up, one case of recurrence was noted at one month, necessitating a second ablation. After three months of follow-up, no recurrence was observed. **Conclusion:** radiofrequency ablation

of isthmo-dependent flutter is a viable treatment option in Togo. The success rate is good, with very few complications. This technique needs to be developed and popularised in other countries.

## Keywords

Atrial Flutter, Ablation, Radiofrequency, Lome

## 1. Introduction

After atrial fibrillation, atrial flutter is the second most common supraventricular cardiac rhythm disorder [1]. It is a single intra-atrial macro-reentry that revolves around an anatomical or scarred obstacle with a narrow zone of slow conduction [2]. In its most common form, macrore-entry is located in the right atrium, where there is a zone of slow conduction in the cavotricuspid isthmus [3]. In Senegal, intrahospital prevalence of atrial flutter was 10% of supraventricular arrhythmias [4]. In Togo, the intrahospital prevalence of atrial flutter was 1.8%, representing 17.3% of supraventricular arrhythmias [5] [6]. The most common symptoms of atrial flutter are palpitations and/or mild chest discomfort. More severe symptoms, such as breathlessness and near-syncope, may occur in patients with diminished reserve (e.g., left ventricular dysfunction or respiratory insufficiency). Atrial flutter can be poorly tolerated from a haemodynamic perspective if the ventricular response is very rapid. The risk of thromboembolic events is lower than for atrial fibrillation at around 2.2% [7]. Pharmacological treatment to prevent recurrence is generally ineffective, with some studies reporting recurrence rates of over 90% within 21 months [3]. Ablation has become the preferred curative treatment, involving the creation of a conduction block in the cavotricuspid isthmus by producing myocardial lesions through the application of radiofrequency energy [8] [9].

For a long time, ablation of arrhythmias was impossible in sub-Saharan Africa. This changed about ten years ago in Senegal [4]. It began in Togo in 2023. There is little data on atrial flutter ablation in sub-Saharan Africa.

This article aims to describe the results of the first cases of atrial flutter ablation by radiofrequency in Togo.

## 2. Patients and Method

This descriptive, cross-sectional study involved the prospective collection of data from April 1, 2023 to April 30, 2024 at the Cardiology Department of Campus Teaching Hospital and Dogta-Lafiè Hospital in Togo.

All patients undergoing radiofrequency ablation for common atrial flutter were included in the study.

The parameters studied were as follows:

- socio-demographic data (age, gender, occupation);
- clinical data (history, symptoms, physical examination);

- paraclinical data (electrocardiogram, cardiac Doppler ultrasound, electrophysiological exploration);
- therapeutic data (drugs, radiofrequency ablation);
- evolution at 1 and 3 months.

Common atrial flutter was diagnosed based on a surface electrocardiogram showing an absence of sinus P waves, which were replaced by auriculograms called F waves. These F waves were triangular in shape, with a steep ascending slope and a gentle descending slope, producing a factory-roof image. Alternatively, the F waves were rectangular, with a steep ascending and descending slope and a horizontal apex, producing a waterwave appearance. Flutter is said to be counterclockwise if the F waves are negative in the inferior leads and positive in V1. It is said to be clockwise if the F waves are positive in the inferior leads and negative in V1.

Electrophysiology was performed in an operating theatre equipped with a Siemens image intensifier, an electrophysiology table, and a Saint Jude electrophysiology rack. A decapolar probe was inserted into the lateral wall of the right atrium to determine whether the atrial flutter was clockwise or counterclockwise. The distal pole was placed at the lower part of the right atrium and the proximal pole at the upper part. Flutter is said to be counterclockwise if depolarisation occurs from the distal to the proximal pole. Otherwise, it is said to be clockwise. We measured the atrial flutter cycle and confirmed cavo-tricuspid isthmus dependence by a post-pacing interval (PPI) of less than 20 ms.

Ablation was performed using an IBI 1500 radiofrequency generator. We used 8 mm non-irrigated Blazer probes with a power output of 60 watts and a temperature of 60°C. Discontinuous, point-by-point radiofrequency application was performed for 120 seconds, from the tricuspid annulus to the inferior vena cava. Successful ablation was determined by the cessation of flutter and the achievement of bidirectional block, as evidenced by a double potential of over 110 ms and differential pacing.

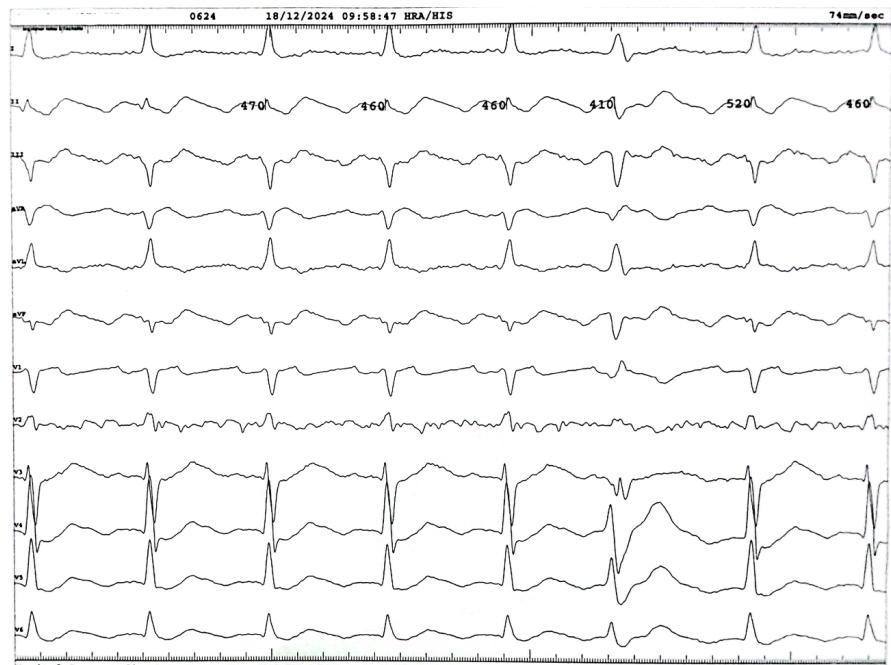
Electrocardiograms were performed at one and three months to check for maintenance of sinus rhythm or recurrence of atrial flutter.

### 3. Results

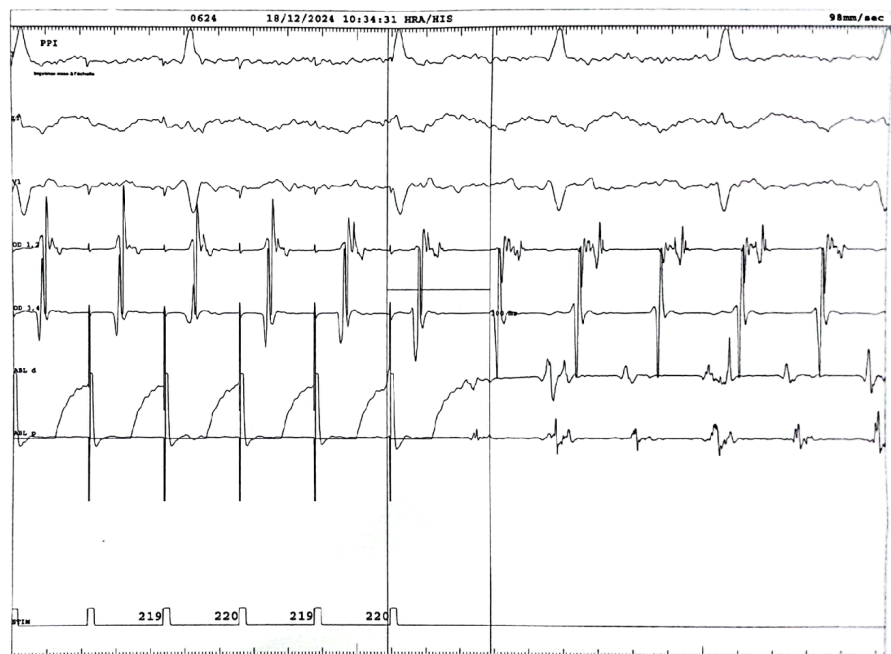
A total of eleven (11) flutter ablation procedures were performed. All patients were male with a mean age of 49.82 years (range 38 - 61 years).

The most common symptom was palpitations, present in eight cases, followed by dyspnoea, present in four cases. Hypertension was present in eight cases. Four patients had dilated cardiomyopathy. Rhythm was irregular in seven cases. The CHA<sub>2</sub>DS<sub>2</sub>-VA score was greater than or equal to 2 in nine cases.

The electrocardiogram showed counterclockwise right atrial flutter in eight cases (**Figure 1**), clockwise flutter in two and sinus rhythm in one. Atrioventricular conduction was fixed in six cases and variable in five. Nine patients were taking rivaroxaban, and three patients were taking acenocoumarol for at least one month prior to ablation.



**Figure 1.** Counterclockwise atrial flutter.



**Figure 2.** Post-potential interval (PPI) measurement.

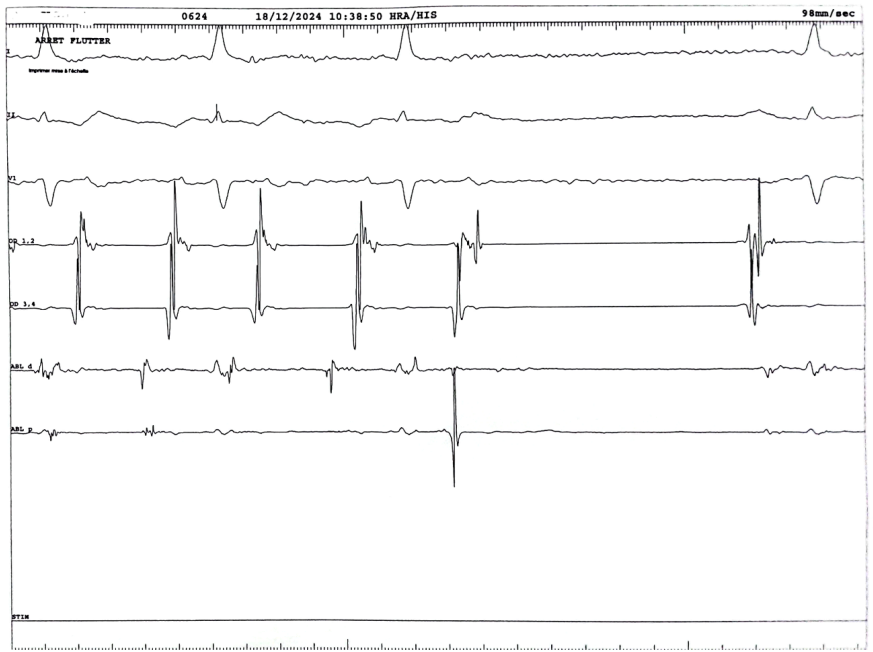
Endocavitary electrophysiology confirmed isthmus-dependent flutter in all cases (**Figure 2**). Counterclockwise atrial flutter was present in eight cases. The mean atrial flutter cycle was  $200 \pm 15$  milliseconds.

The mean duration of radiofrequency ablation was  $120 \pm 15$  minutes, with an average of  $35 \pm 5$  radiofrequency shots. Flutter arrest was achieved in all cases (**Figure 3**). Bidirectional block was present in ten out of eleven cases. No compli-

cations or incidents occurred during the procedure, but one case of haematoma was observed in the immediate post-procedure period.

One case of recurrence was noted at one month, and this patient successfully underwent a second ablation procedure. No recurrence was found at three months.

**Table 1** summarizes patient demographics, comorbidities, and outcomes.



**Figure 3.** Atrial flutter arrest during ablation by radiofrequency.

**Table 1.** Patients demographics, comorbidities, and outcomes.

| Patients  | Age (Years) | Sexe | Comobidities                                        | Clinical      | Electrocardiogram        | Ablation | Follow up                                                                                                       |
|-----------|-------------|------|-----------------------------------------------------|---------------|--------------------------|----------|-----------------------------------------------------------------------------------------------------------------|
| Patient 1 | 56          | Male | Hypertension<br>Dilatated cardiomyopathie           | Heart failure | Counterclockwise flutter | Success  | No recurrence                                                                                                   |
| Patient 2 | 60          | Male | Hypertension, diabetes<br>Dilatated cardiomyopathie | Heart failure | Counterclockwise flutter | Success  | Recurrence at one month which successfully underwent a second ablation procedure. No recurrence at three months |
| Patient 3 | 61          | Male | Hypertension, diabetes<br>Dilatated cardiomyopathie | Normal        | Counterclockwise flutter | Success  | No recurrence                                                                                                   |
| Patient 4 | 58          | Male | Hypertension                                        | Normal        | Counterclockwise flutter | Success  | No recurrence                                                                                                   |
| Patient 5 | 38          | Male | -                                                   | Normal        | Counterclockwise flutter | Success  | No recurrence                                                                                                   |
| Patient 6 | 49          | Male | Hypertension                                        | Normal        | Counterclockwise flutter | Success  | No recurrence                                                                                                   |

## Continued

|            |    |      |                                         |        |                          |         |               |
|------------|----|------|-----------------------------------------|--------|--------------------------|---------|---------------|
| Patient 7  | 40 | Male | -                                       | Normal | Sinus rhythm             | Success | No recurrence |
| Patient 8  | 38 | Male | -                                       | Normal | Clockwise flutter        | Success | No recurrence |
| Patient 9  | 57 | Male | Hypertension, Dilatated cardiomyopathie | Normal | Counterclockwise flutter | Success | No recurrence |
| Patient 10 | 45 | Male | Hypertension                            | Normal | clockwise flutter        | Success | No recurrence |
| Patient 11 | 46 | Male | Hypertension                            | Normal | Counterclockwise flutter | Success | No recurrence |

## 4. Discussion

The small size of our sample means that in-depth statistical analysis and conclusions are not possible. Nevertheless, these are the first cases of atrial flutter ablation in Togo and among the few performed in French-speaking sub-Saharan Africa. This contributes to the body of knowledge on radiofrequency ablation of this condition in the region.

The mean age of our patients was  $49.82 \pm 12.21$  years. Our patients were younger than those studied by Beye [4] in Senegal, who had a mean age of 59.1 years. Atrial flutter is a disease of males, as reported in the literature [4] [10] [11].

The clinical manifestations of flutter are often subtle, and the onset of arrhythmia may cause palpitations and dyspnoea [3] [4]. In our study, the most frequently observed symptom was palpitations, followed by dyspnoea.

As in other studies, counterclockwise right atrial flutter was more prevalent in our study [12] [13].

Catheters used for ablation can be either 8 mm non-irrigated or 4 mm irrigated. Studies have demonstrated the superiority of irrigated catheter ablation over non-irrigated ablation. Jais *et al.* achieved a 100% success rate using an irrigated catheter, compared to 85% using a conventional catheter [14]. Pena Perez found similar results, achieving a 100% success rate with the irrigated catheter versus 90% with the conventional catheter [15]. In our study a 8 mm non-irrigated catheter was used, but in Senegal 4 mm irrigated catheter was used [4].

In low-income countries, access to ablation techniques for rhythm disorders is very limited. Firstly, there is a shortage of trained personnel; secondly, catheterisation and electrophysiology rooms are rarely available; and thirdly, the cost of consumables and the procedure itself limits access to this technique in these countries. This explains why this technique is practised in very few countries in sub-Saharan Africa [16] [17].

We applied an average of 35 radiofrequency shots, which is higher than the 30 radiofrequency shots used by Anselme F *et al.* [18] with a temperature ranging from 60 to 70 degrees and a duration ranging from 60 to 240 seconds. The mean ablation time was  $120 \pm 15$  minutes, which is longer than that reported by Georger

*et al.* [7], whose series showed a mean procedure time of  $53 \pm 15$  minutes. In Senegal, the mean time was 123 minutes [4]. This difference can be explained by the fact that this is a new activity for us with a slow learning curve, and by the fact that we use re-sterilised catheters.

Despite the small sample size, the success rate is very good, with only one case of recurrence within one month requiring repeat ablation. In Senegal, Beye found two cases of recurrence (on 20 ablation) at one month and none at three months [4]. The immediate success rate reported in the literature is 99% [14] [19] [20]. The long-term prognosis is highly satisfactory, with 80% of patients maintaining sinus rhythm compared to 36% of patients treated with amiodarone after an average follow-up period of  $21 \pm 11$  years [21]. While the three-month follow-up provides some insight into our study, it is important to acknowledge that atrial flutter recurrence can occur beyond this timeframe, which could affect the evaluation of long-term outcomes.

Complications are rare, ranging from 0.5% to 2.6% [22]. These include haematoma, false aneurysm, and arteriovenous fistula at the puncture site; complete atrioventricular block; tamponade; right coronary occlusion; and vascular embolism. We noted one case of haematoma at the femoral puncture site.

## 5. Conclusion

Radiofrequency ablation is currently the standard treatment for atrial flutter. It has become a reality in Togo, with a high success rate and very few complications despite the small sample size. This technique could be offered to all patients with atrial flutter to improve their prognosis and quality of life.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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