

Characteristics of Thyroid Nodule Patients Undergoing Radiofrequency Ablation (RFA) at RSUD Dr. Soetomo Surabaya from January 2023 to December 2024

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Abstract

The availability of platelets in the Blood Donor Unit (UDD) of the Indonesian Red Cross (PMI) is relatively high each year. National data show that the number of platelet bags collected in 2019 reached 767,680 bags, increasing to 957,397 bags in 2021. However, the surge in dengue fever cases coinciding with the COVID-19 pandemic has nearly doubled the demand for concentrated platelets (TP) in hospitals since 2021. One method to extend platelet shelf life is the addition of platelet additive solution (PAS), which has not yet been implemented in Indonesia. This study aims to determine whether TP obtained through the buffy coat leukofiltered pooling method and stored with PAS can improve platelet quality during storage. The research methodology includes platelet quality analysis using several parameters, including platelet count, pH stability, and aggregation testing through adenosine diphosphate (ADP) examination of TP products over the storage period from day 0 to day 7. The results indicate that the addition of PAS helps maintain platelet quality, stabilize pH levels, and preserve platelet function during storage. This is made possible by the presence of key PAS components such as glucose, sodium acetate, sodium chloride, phosphate, magnesium, and potassium, which contribute to platelet stability and viability. The implications of this study suggest that implementing PAS in TP storage could serve as an effective solution for enhancing platelet availability while maintaining quality over an extended period. Therefore, adopting PAS in Indonesia's platelet storage system could be a significant innovation to support blood supply sustainability, particularly in medical emergencies such as dengue fever outbreaks and pandemics.

Keywords: concentrated platelets, platelet additive solution, platelet quality, buffy coat, shelf life.

Introduction

The incidence of thyroid nodules has gradually increased in recent years, but their treatment has been controversial to date. Current guidelines suggest that clinically asymptomatic nodules should be treated with watchful waiting, however some patients require treatment due to cosmetic concerns or symptoms. The widespread use of thyroid ultrasound and other imaging modalities has led to increased detection of thyroid nodules, although only 10-20% are symptomatic (Che, Y. et al, 2015).

Although the incidence rate of malignancy is as low as 5%-15%, malignancy is still a concern in thyroid nodules. Total or partial thyroidectomy has become the main modality of treatment for differentiated thyroid cancer (DTC) as well as symptomatic benign thyroid nodules. but after nodule resection, patients often have neck scars or hypothyroidism, which seriously affects their quality of life. Additional problems include general anesthesia risks and postoperative parathyroid function abnormalities (Che, Y. et al, 2015).

Therefore, alternatives to minimally invasive surgery are being pursued. Ethanol ablation, laser ablation, microwave ablation, and radiofrequency ablation (RFA) are safe and effective techniques for the treatment of thyroid nodules. Ethanol ablation is useful for cystic nodules but not for solid nodules. Laser ablation, microwave ablation, and RFA are each useful for nodules

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of different sizes. radiofrequency ablation (RFA) is more popular nowadays. RFA uses alternating current, with frequencies ranging between 200 and 1200 kHz, to generate localized thermal energy. This produces temperatures between 50 and 100°C resulting in tissue necrosis. RFA is stopped when the nodule area becomes hyperechoic on US or when the impedance increases, or a combination of both, so that the patient's thyroid nodules shrink (Cesareo, R. et al., 2020).

The use of RFA for minimally invasive procedures for thyroid nodules began in RSUD dr. Soetomo starting in 2023. This study was conducted to record the characteristics of a sample of thyroid nodule patients who underwent RFA at RSUD dr. Soetomo from the beginning.

Research Methods

This study is an observational descriptive study. The design used in this descriptive observational study is cross-sectional from the medical record data of thyroid nodule patients who performed radiofrequency ablation to determine and the characteristics of the sample in a single center, namely RSUD Dr Soetomo Surabaya during a certain period (January 2023 - December 2024). This study was conducted at RSUD Dr. Soetomo Surabaya during the period of January 2023 - December 2024. The study population was the medical record data of thyroid nodule patients who underwent radiofrequency ablation (RFA) who were treated and/or underwent surgery at RSUD Dr Soetomo Surabaya, with inclusion and exclusion criteria. The research sample was medical record data of patients with thyroid nodules who underwent radiofrequency ablation (RFA) at RSUD Dr. Soetomo Surabaya from January 2023 - December 2024 who met the inclusion and exclusion criteria. The research sample data was taken by total sampling of all patients with thyroid nodules who performed radiofrequency ablation at RSUD Dr. Soetomo Surabaya in the period January 2023 - December 2024 who met the inclusion and exclusion criteria.

Researchers will collect medical record data of patients with thyroid nodules who underwent RFA at RSUD Dr. Soetomo Surabaya in the period January 2023 - December 2024. Sample data will be selected according to the inclusion-exclusion criteria of the study. The amount of sample data collected will be used as the total sample. Data on dependent variables during patient care will be recorded, such as demographic data, pre and post-action thyroid faeces, and evaluation of nodule size with Thyroid ultrasound 6-12 months after RFA. Data processing is done descriptively and statistical calculation analysis. Researchers used the SPSS 23.0 for windows program to process the research data. Descriptive data of research variables will be presented in the form of tables, diagrams and cross tabulation. This research was conducted at the Central Medical Record Unit and Department of Surgery of RSUD Dr. Soetomo Surabaya. The study will be conducted for 8 months, starting from November 2024 to February 2025.

Results and Discussion

During the period January 2023 - December 2024, this study obtained patients with thyroid nodules who performed RFA at RSUD Dr. Soetomo Surabaya. Data that met the research criteria were subjects, consisting of 1 male (11.11%) and 8 females (88.89%). In this study, age was grouped into 3 age groups, namely < 20 years, 20 - 50 years, and \geq 50 years. From the data, it was found that the most subjects in the age range of 20-50 years were 6 subjects (66.67%) and >50 years were 3 subjects (33.33%) respectively. Table 5.1 below shows the demographic characteristics of patients with thyroid nodules who performed RFA at RSUD Dr. Soetomo

Surabaya during the period January 2023 to December 2024.

Table 1. Demographic data of research subjects

Variables	n	%
Gender		
Male	1	11.11
Female	8	88.89
Age		
<20	0	0
20-50	6	66.67
>=50	3	33.33
Total	9	100

From the supporting examination table, it was found that the type of thyroid nodule was mostly cystic mix solid totaling 6 samples (66.67%), 2 samples (22.22%) with solid nodules, and 1 sample (11.11%). In this study, it was found that the nodule size was <2 cm in the amount of 1 sample (11.11%), the nodule size was 2-5 cm in the amount of 7 samples (77.78%), and a total of 1 sample (11.11%) with a nodule size >5 cm.

Table 2. Data on nodule type and nodule size based on preoperative ultrasound

Variables	n	%
Nodule Type		
Cystic	1	11.11
Solid	2	22.22
Cystic mix-solid	6	66.67
Nodule Size		
< 2cm	1	11.11
2 - 5 cm	7	77.78
> 5 cm	1	11.11
Total	9	100

From the table of evaluation ultrasound examination 6-12 months post RFA, the nodule size below 1 cm was obtained in 4 samples (44.44%), 4 samples (44.44%) were obtained whose post RFA nodule size was 1-2 cm, and there was 1 sample (11.11%). When compared with the initial nodule size Patients obtained 8 samples (88.89%) which obtained a size reduction of 50 - 90% and 1 sample (11.11%) which obtained a size reduction of < 50%.

Table 3. Nodule size data and post RFA nodule size measurement based on 6-12 postoperative ultrasound

Variables	n	%
Post RFA nodule size		
<1 cm	4	44.44
1-2 cm	4	44.44
➤ 2 cm	1	11.11
Nodule size reduction		
< 50%	1	11.11
50 - 90 %	8	88.89
> 90 cm	0	0
Total	9	100

From the table of Pre-operative and postoperative thyroid faal examination, it was found that thyroid faal was normal in all samples, both preoperatively and postoperatively.

Table 4. Pre and postoperative thyroid function examination

Variables	n	%
Pre-operative Thyroid Function		
Hypothyroid	0	0
Euthyroid	9	100.00
Hyperthyroid	0	0
Post-operative Thyroid Function		
Hypothyroid	0	0
Euthyroid	9	100.00
Hyperthyroid	0	0
Total	9	100.00

This study generally discusses the profile and general characteristics of patients with thyroid nodules who performed RFA at Dr. Soetomo Hospital from January 2023 to December 2024. The majority of patients suffering from thyroid nodules are female (88.89%) This is in accordance with the literature which states that the female sex suffers more from thyroid nodules than the male sex. The sample in this study found the majority who suffered from thyroid nodules aged 20-50 years, this is in accordance with the literature which states that patients who have thyroid nodules have a low risk of malignancy at the age of 20-50 years in women and 20-40 years in men.

In this study, all samples underwent thyroid ultrasound examination to assess thyroid nodule type and thyroid size. In this study, the majority of patients had cystic mix- solid thyroid nodule type (66.67%). Thyroid ultrasound is a mainstay diagnostic tool to assess the size, echogenicity, and characteristics of nodules. With ultrasound, nodules can be categorized based on their

echogenicity patterns, such as hyperechoic, isoechoic or hypochoic. These patterns provide clues as to whether the nodules are more likely to be benign or malignant. The size of thyroid nodules in this research sample is the majority with a size between 2-5 cm (77.78). This is in accordance with the theory that thyroid nodules with a size of 2-5 cm can be performed RFA as one of the therapeutic options. One of its main advantages is its non-invasive nature, so it does not require incisions as in conventional surgery. Another advantage of RFA is the fast recovery time. As there are no large incisions or the use of general anesthesia, patients can usually return to their daily activities within a short period of time, often just a few hours after the procedure is completed.

In this study, the results of ultrasound evaluation 6-12 months postoperatively showed that the majority of sizes were reduced by 50-90% of the initial size. This is in accordance with previous research which states that RFA is effective in reducing the size of thyroid nodules by 50-80% from the initial size before RFA. This not only helps reduce compression symptoms, but also improves cosmetic appearance, especially in patients with visible thyroid enlargement. RFA is also a safer option for high-risk patients who are unsuitable for surgery, such as patients with comorbidities or those who cannot receive general anesthesia. In addition, the procedure can be repeated if needed, giving patients and doctors more flexibility to monitor and manage thyroid nodule progression in the long term. In addition to volume reduction, the doctor will also check if there are any signs of regeneration or regrowth in the nodule. If necessary, the doctor may recommend additional measures, such as a repeat RFA procedure, to treat the parts of the nodule that have not been completely ablated.

Conventional thyroidectomy surgery (total thyroidectomy or isthmus lobectomy) has a risk of complications in the form of hypothyroidism. In non-invasive RFA actions with minimal lesions to the thyroid gland can minimize the incidence of postoperative hypothyroidism. This is in accordance with the results of this study, namely all research samples obtained pre and postoperative thyroid function results all with euthyroid.

Conclusion

This study aims to analyze the profile of patients with thyroid nodules undergoing radiofrequency ablation (RFA) at RSUD Dr. Soetomo Surabaya from January 2023 to December 2024, with a focus on the effectiveness and safety of the procedure. The findings indicate that thyroid nodule cases predominantly affect women aged 20-50 years. The RFA procedure demonstrated a significant reduction in nodule size, ranging from 50% to 90%, with no recorded cases of hypothyroidism as a complication. These results highlight the effectiveness and safety of RFA in managing thyroid nodules, reinforcing its role as a viable non-surgical treatment option.

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First Publication Right:

Journal of Health Science

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