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Laporan Kasus

# TAKIKARDIA SUPRAVENTRIKULAR PADA PASIEN USIA MUDA: "APA YANG BISA KITA LAKUKAN DI RUMAH SAKIT DAERAH?"

## *SUPRAVENTRICULAR TACHYCARDIA IN YOUNG AGED PATIENT :"WHAT CAN WE DO IN RURAL HOSPITAL?"*

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**A B S T R A K**

Takiaritmia supraventrikular merupakan sekumpulan gangguan irama jantung yang berasal dari nodus sinus, jaringan atrium, jaringan suplementer, dan daerah junctional. Seorang laki-laki berusia 19 tahun dibawa oleh keluarganya ke IGD RSUD Muda Sedia Aceh Tamiang dengan keluhan jantung berdebar-debar yang dirasakan 1 hari SMRS disertai keringat dingin. Pasien mengalami keluhan yang sama 5 tahun yang lalu dan pernah berobat ke poliklinik, dan pasien mengatakan keluhan tersebut tiba-tiba dirasakan 2 tahun. Riwayat mengangkat barang dagangan (+). Pada pemeriksaan fisik didapatkan pasien sadar compos mentis, GCS 15 dengan frekuensi nadi 223x/menit. Takikardia supraventrikular (SVT) merupakan takiaritmia yang berasal dari atau dihantarkan melalui atrium atau nodus atrioventrikular (AV). Terjadi pada denyut jantung lebih dari 100 denyut/menit, Penatalaksanaan takiaritmia supraventrikular terdiri dari penatalaksanaan fase akut dan lanjutan. Penatalaksanaan fase akut ditujukan untuk mengatasi kegawatdaruratan hemodinamik, konversi aritmia, dan meredakan gejala klinis. Penatalaksanaan takiaritmia supraventrikular lanjut dapat berupa terapi definitif seperti ablasi frekuensi radio atau terapi di rumah. Anamnesis dan pemeriksaan fisik sangat penting untuk penatalaksanaan takiaritmia supraventrikular.

***A B S T R A C T***

*Supraventricular tachyarrhythmias are a group of heart rhythm disorders originating from the sinus node, atrial tissue, supplementary tissue, and junctional areas. A 19-year-old man was brought by his family to the emergency room of Muda Sedia Aceh Tamiang Hospital with complaints of heart palpitations that were felt 1 day before hospitalization accompanied by cold sweat. The patient had the same complaint 5 years ago and was taken to the clinic, and the patient said the complaint suddenly felt 2 years. History of lifting trade goods (+). Physical examination found that the patient was compos mentis, GCS 15 with a pulse frequency of 223x/minute. Supraventricular tachycardia (SVT) is a tachyarrhythmia that originates from or conducts through the atria or atrioventricular (AV) node. It occurs at heart rates greater than 100 beats/minute, The management of supraventricular tachyarrhythmias consists of acute and continuation phase management. Acute phase management is aimed at addressing hemodynamic emergencies, arrhythmia conversion and relief of clinical symptoms. Advanced supraventricular tachyarrhythmia management can be in the form of definitive therapy such as radiofrequency ablation or in the form of home therapy. Anamnesa and physical examination are very important for the management of supraventricular tachyarrhythmias*

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## PENDAHULUAN

Supraventricular tachyarrhythmias (SVT) are a group of heart rhythm disorders originating from the sinus node, atrial tissue, supplementary tissue, and junctional areas.

Cardiovascular or heart disease is one of the leading causes of death in Indonesia, even in the world. The World Heart Federation (WHF) recorded 20.5 million deaths from cardiovascular disease in 2021. The human heart is an important organ that has the main function of pumping blood throughout the body. The heart not only functions as a pump to circulate blood, but also plays an important role in regulating hemodynamics throughout the organism. Cardiac arrhythmia is a heart disease with heart rhythm abnormalities that are faster (tachycardia), slower (bradycardia), or irregularly.[1] Arrhythmia is an abnormal heart rhythm that does not originate from the SA node (Sino-Atrial), irregular rhythm even though it comes from the SA node, frequency less than 60 times/minute (bradycardia) or more than 100 times/minute (tachycardia), and obstacles occur in supra or intraventricular. Supraventricular Tachycardia (SVT) is a type of tachydysrhythmia characterized by a sudden change in heart frequency that accelerates to between 150 and 280 per minute.[2]

Supraventricular tachycardia (SVT) is the most common type of dysrhythmia. In the US, SVT is relatively common in adults with 89,000 new cases diagnosed annually and as many as 50,000 visits to the emergency department each year.[3] In Indonesia, the prevalence of SVT patients at the Harapan Kita National Heart Center is around 9% of all arrhythmia patients and around 1.26% - 1.42% of all hospital visits. Until now, data for the prevalence of SVT in the general population in Indonesia is unknown.[4] The older population increases the risk of SVT even up to five times.[5] The mortality rate of this rhythm disorder is unclear, but in SVT that is ablated, the mortality rate is only 0.02%.[6] Until now, the prevalence of TSV in the general population in Indonesia is unknown.

The management of supraventricular tachyarrhythmias consists of acute and continuation phase management. Acute phase management is aimed at addressing hemodynamic emergencies, arrhythmia conversion and relief of clinical symptoms. Advanced supraventricular tachyarrhythmia management can be in the form of definitive therapy such as radiofrequency ablation or in the form of home therapy. Definitive therapy of supraventricular tachyarrhythmias is a therapeutic modality that can completely cure supraventricular tachyarrhythmias. Management of advanced supraventricular tachyarrhythmias must consider several factors, including: clinical conditions (frequency, duration of TSV, and other related symptoms) and patient preferences.[7]

## CASE PRESENTATION

A 19-year-old man was brought by his family to the emergency room of RSUD Muda Sedia Aceh Tamiang with complaints of heart palpitations felt 1 day SMRS accompanied by cold sweat. The patient had the same complaint 5 years ago and was taken to the clinic, and the patient said the complaint suddenly felt 2 years ago. History of lifting trade goods (+). Physical

examination found that the patient was compos mentis, GCS 15 with a pulse frequency of 223x/minute. Examination of the head, neck, thorax, abdomen and extremities were within normal limits. Troponin-I laboratory examination was negative.

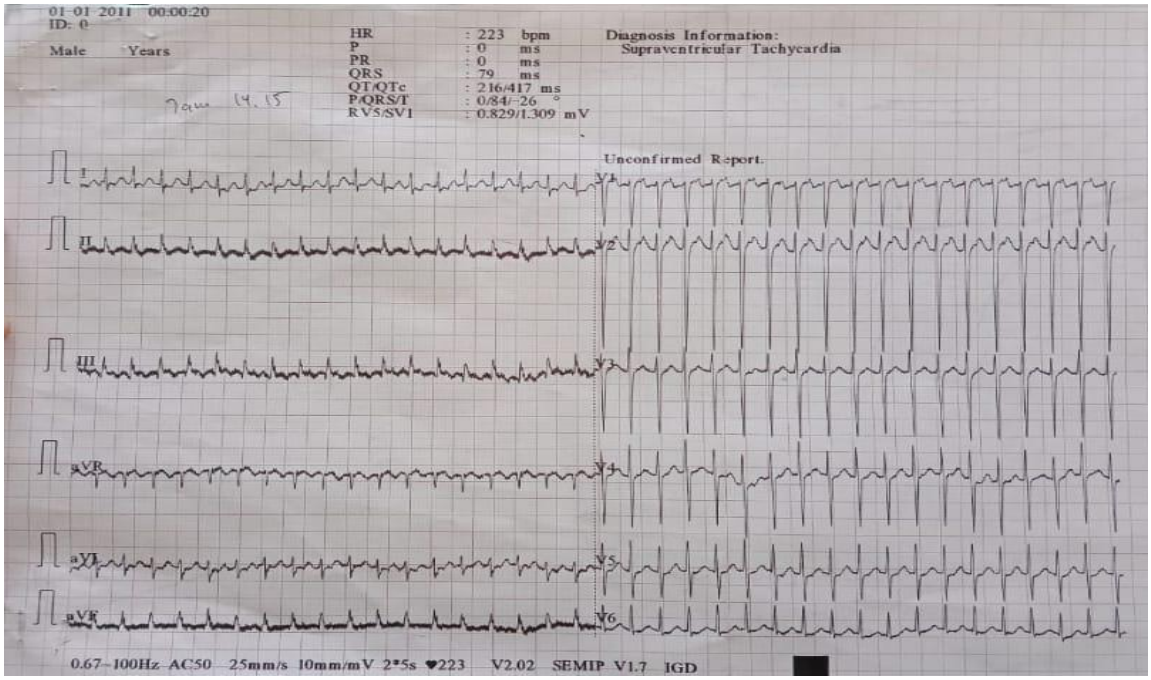


**Figure 1. ECG examination on admission**

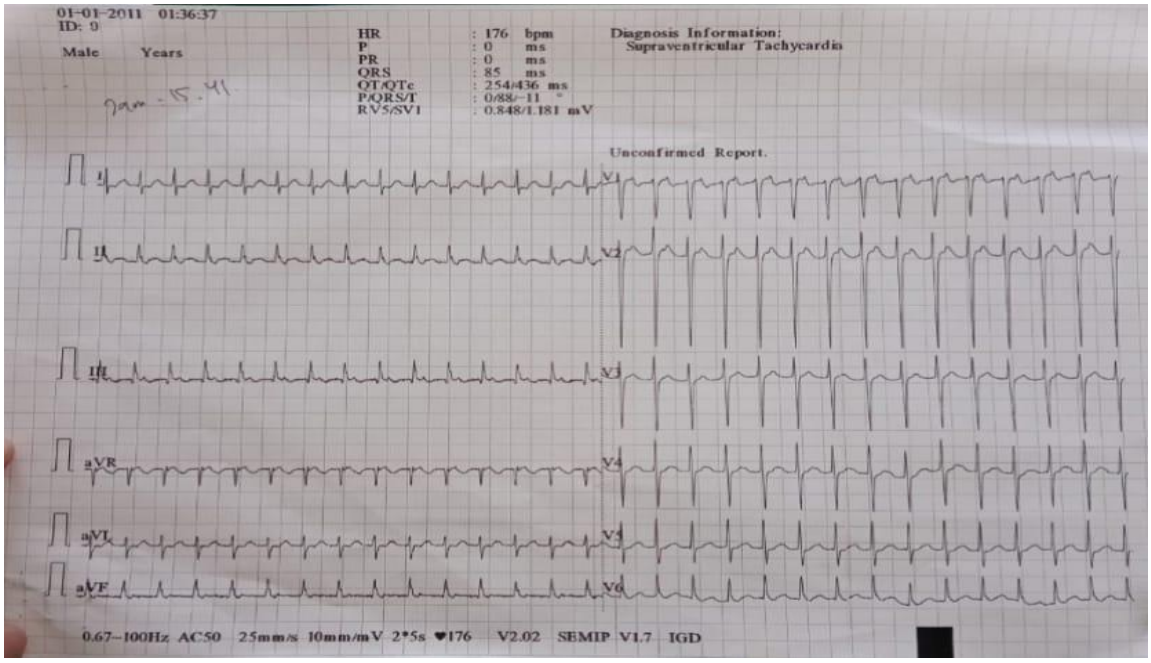


**Figure 2. ECG examination after treatment**

Electrocardiography is presented in **Figure 1**. In the initial ECG picture showed heart rate above 220/ min with narrow QRS complexes and absence of P waves which interpretation with SVT, SVT was found, so the patient was diagnosed as stable supraventricular tachycardia.

Initial non-pharmacological management carried out in this patient was carried out vagal maneuver, namely circular massage in the carotid sinus area for 10 seconds and pharmacological management was given in the form of amiodarone 300mg in 10cc Nacl 0.9% discharged in 10 minutes, bisoprolol 5 mg extra in the igd, ranitidine injection 50mg/12 hours, furosemide tablets 1x40mg and ICU care. The results of the electrocardiographic examination of the patient have not changed after the administration of therapy so that the dose of amiodarone is increased to amiodarone 600mg in 50cc D5%50cc via syringe pump discharged in 24 hours can be seen in **Figure 2**.

During the treatment, a series of supporting examinations such as complete blood test, thorax X-ray and echocardiography were performed. It was decided to refer the patient for immediate ablation and electrophysiology study.

## DISCUSSION

Arrhythmia with tachycardia is one of the emergencies that is often found in the ER. However, very often VT and SVT with aberrant especially in young aged patients make general practitioners confused about taking further action. The usual thing to do to differentiate them is to look at the ECG image, where differentiating these two things is important for further treatment and prognosis.[8]

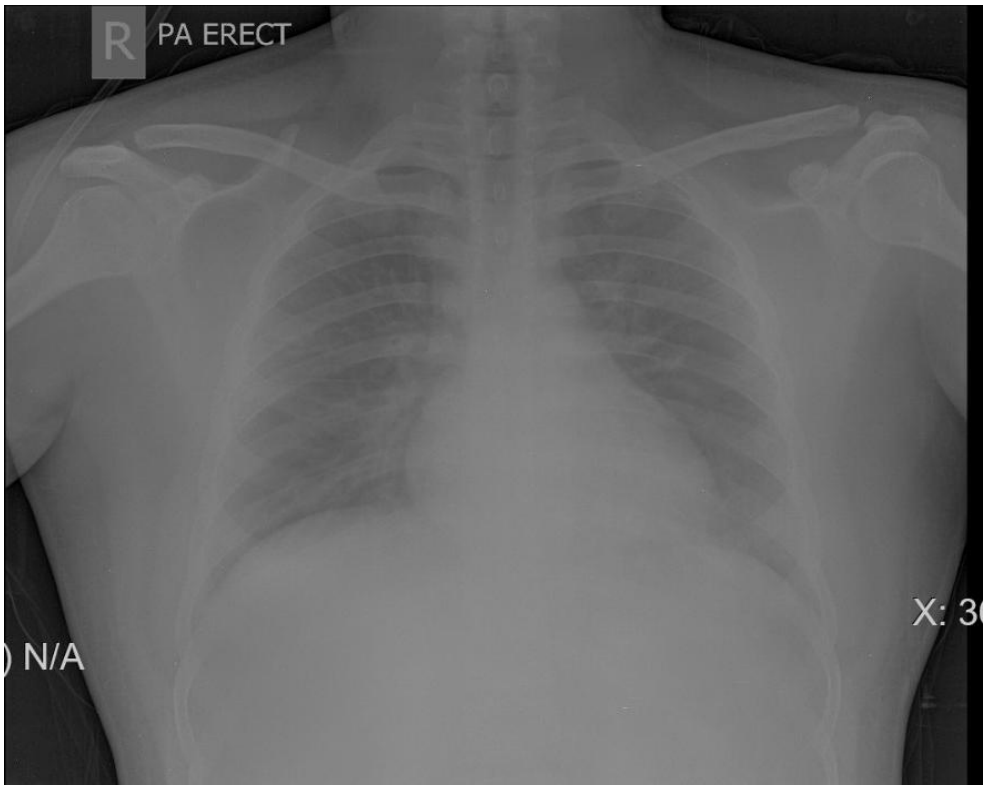


**Figure 3. Thorax X-ray Show no deformity**

Supraventricular tachycardia (SVT) is a tachyarrhythmia originating from or conducting through the atria or atrioventricular (AV) node. It occurs at heart rates greater than 100 beats/minute, usually conducts through the His-Purkinje system and appears as a narrow QRS tachyarrhythmia (120 ms) on the electrocardiogram (ECG).[9] Supraventricular tachycardia greatly affects the quality of life of its patients. Decreased quality of life in patients with TSV depends on the frequency of occurrence, duration of TSV, and also whether the symptoms occur during exertion or at rest. The most common complaint in patients with TSV is palpitations.[10,11] The heart rate is usually very fast, between 150 and 250 kpm. In adults it is usually around 160-200 kpm while in children it can exceed 250 kpm. A cannon wave A can be seen in the neck due to simultaneous atrial and ventricular contractions. Hypotension may occur when TaRNAV is very rapid and long lasting. In patients with decreased ejection fraction, signs of heart failure may appear.[4]

Patients can exhibit symptoms like palpitations, chest pain, lightheadedness, fainting, shortness of breath, or anxiety. In certain instances, individuals may present in a state of shock, showing low blood pressure or indications of heart failure, particularly if the supraventricular tachycardia has continued for many hours or days. The beginning of symptoms is usually abrupt and can be precipitated by stress, either from physical exertion or emotional tension. The cessation of the episode also generally happens suddenly. During a physical assessment, a fast pulse rate at rest might be noted, in addition to rapid breathing, occasional paleness, and sweating. Patients starting to decompensate could display indications of congestive heart failure, for example, bibasilar crackles, a third heart sound (S3), or distended jugular veins.[12]

Correct diagnosis is important as it has significant implications for management and prognosis. Assessment of the patient's history is useful to determine the predisposition to arrhythmia whether ventricular in origin or above. The hemodynamic status of patients with SVT should be assessed quickly. Certain patients with cardiac comorbidities may not tolerate rapid ventricular rates, which may lead to hemodynamic instability, acute congestive heart failure or angina. If the patient is considered unstable due to SVT, the patient should undergo synchronized electrical cardioversion.[13]

The principles of TaSuV management consist of acute and follow-up phase management. Acute phase management is aimed at addressing hemodynamic emergencies, arrhythmia conversion, and relief of clinical symptoms. Advanced TaSuV management can be in the form of definitive therapy such as radiofrequency ablation or in the form of home therapy. TaSuV definitive therapy is a therapeutic modality that can completely cure TaSuV. Advanced TaSuV management must consider several factors, including clinical conditions (frequency, duration of TSV, and other related symptoms) and patient preferences.[4]

If the patient is stable, then the most important diagnostic step is to obtain a 12-lead ECG. Once the ECG is obtained, then a four-step approach is suggested to diagnose the

underlying rhythm. First, determine whether the QRS complex is narrow (< 120 ms) or wide (≥ 120 ms). Narrow complexes confirm the supraventricular origin of the arrhythmia; wide complexes may indicate ventricular tachycardia or SVT with aberrations. Second, assess whether the rhythm is regular or irregular if the QRS complexes are narrow.[14,15]

Vagal maneuver is a non-invasive technique that stimulates carotid baroreceptors, produces reflex parasympathetic outflow, and slows conduction through the AV node. Currently, vagal maneuvers are the first-line therapy for patients with PSVT who are hemodynamically stable.[9] In patients presenting with unstable SVT, vagal maneuvers are contraindicated, and healthcare personnel should perform emergent synchronized cardioversion.[16]

If vagal maneuvers are not effective, pharmacotherapy becomes necessary. The first-line medication for supraventricular tachycardia is adenosine, an endogenous nucleoside that creates a transient blockade of the adenosine A1 receptors. This blockage interrupts conduction through the atrioventricular node, disrupting the reentry circuit and allowing for restoration of the sinus rhythm.[17] The adverse effects of adenosine are typically self-limited due to its short duration of action and quick metabolism. These adverse effects may include flushing, chest discomfort, and dyspnea. After administration of adenosine, transient arrhythmias may occur, such as sinus pauses, sinus bradycardia, asystole, and premature atrial or ventricular depolarizations. There have been case reports of bronchoconstriction following adenosine administration, particularly in patients with preexisting obstructive lung disease.[18]

Administering β-blockers to patients is beneficial as a rate control agent and is recommended by guidelines for acute therapy as an alternative to calcium channel blockers if adenosine is ineffective. In a study of 42 patients, diltiazem, 120 mg, plus propranolol, 80 mg, resulted in a higher rate of cardioversion within 2 hours compared with placebo (94% vs 52%). β-blockers should be avoided in patients with acute decompensated heart failure.[19]

Despite limited evidence, antiarrhythmics may be beneficial in the acute management of PSVT. Ibutilide and amiodarone may be used in the treatment of AVRT or focal AT. One observational study involving 38 patients with focal AT showed that ibutilide was effective in cardioversion of 39% of arrhythmia episodes.[20] Antiarrhythmic drugs are preferred over AV node drugs in patients with antidromic AVRT. All antiarrhythmic drugs have the potential to cause proarrhythmic effects, so outpatient follow-up with ECG monitoring is recommended.

Electrophysiology study (SEF) is a specialized type of examination using cardiac catheters aimed at identifying, diagnosing and managing cardiac arrhythmias. In recent decades, it has contributed greatly to the understanding of arrhythmia mechanisms and management. Electrophysiology studies involve the placement of multiple electrode catheters at multiple sites in the heart (atria, ventricles, His, and/or sinus coronarius). Programmed electrical triggering and stimulation can be performed with or without pharmacologic provocation. Using

SEF diagnostic maneuvers, the mechanism of most TaSuV cases can be determined.[21] During SEF, cardiac mapping is performed to identify the source of an arrhythmia or an important conduction region to allow target ablation. Diagnostic electrophysiologic studies rarely cause complications, but can also give life-threatening complications.[22]

Catheter ablation uses a narrow plastic tube, or catheter, to kill cells responsible for the heart rhythm problems caused by supraventricular tachycardia.The risks and benefits of catheter ablation of additional leads should be considered in light of the low complication risk (0.1% for second-degree AV node block, and 92 0.9% for right bundle branch block).[23] A study involving 514 patients with focal atrial tachycardia who underwent ablation showed a success rate of 86% and a recurrence rate of 8%. In this study, focal atrial tachycardia was found in the left atrium in 18% and multiple foci were found in 10% of patients. The complication rate in atrial tachycardia patients undergoing ablation is very low at only 1-2% in less experienced centers. Complications can include cardiac perforation, right and left phrenic nerve damage and sinoatrial node dysfunction. Ablation of foci of atrial tachycardia found in the atrial septum or Koch's triangle can cause AV block. Catheter ablation is the best management in TA patients who are refractory to medication, sustained atrial tachycardia, or patients with cardiomyopathy complications due to atrial.[4]

Most patients experiencing paroxysmal supraventricular tachycardia typically have a positive outcome with treatment. For those with structural heart defects, the outlook depends on the particular nature of the defect. Healthy persons without structural abnormalities possess a very favorable prognosis. It is important to note that pregnant patients who develop supraventricular tachycardia encounter a moderately elevated risk of complications, especially if they have an uncorrected cardiac defect.[24,25,26]

## CONCLUSION

SVT is an abnormal rhythm in the upper pumping chamber of the heart. The heart normally beats around 60-100 beats per minute at rest and increases during exercise. A heart rate faster than 100 beats per minute is considered tachycardia. During SVT, the heart beats so fast that the heart muscle is unable to relax between contractions. These inefficient heart contractions decrease cardiac output (circulation of blood and oxygen) and may cause blood pressure to drop. A detailed history and physical examination are essential. Complaints that can be found in SVT patients include palpitations and cold sweat.

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