- *Basic Research*

Effect of Using anatomical Snuffbox Technique in Arterial Blood Sampling on Patients' Clinical Outcomes

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Abstract

Background: Anatomical snuff box technique is an advanced technique of obtaining arterial blood sample used recently, it has low risk of vascular complication and allows a faster and easier blood sampling. Because the radial artery in the anatomic snuffbox has some collateral branches, ischemia of the hand and occlusion risk is decreased. **Aim of the Study:** to evaluate the effect of using anatomical snuff box technique in arterial blood sampling on patients' clinical outcome. **Subjects and methods:** Quasi experimental research design was used (two groups: control and study groups) to conduct the present research. **Setting:** it was conducted at recovery room of cardiac catheterization unit and neurosurgery wards in Damanhour National Medical Institution hospital, El Beheira Governorate, Egypt. Purposeful sample, 60 adult patients divided equally and randomly into study and control groups in the mentioned settings were included in the study. **Tool**: Three tools were used for data collection: **Tool I:** " Patients' personal and clinical profile ", **Tool II:** "Patients Clinical Outcomes assessment questionnaire" and **Tool III: "**Numerical pain rating scale". **Results:** that the study group showed statistically significant lesser duration in applying manual pressure to achieve hemostasis; the vast majority of them (93.3%) required < 5 minutes compared to (36.7%) of those in the control group ($p<0.001^{*}$). Statistically significant differences were found between the study and control group as regards pain, hematoma, and bleeding ($p = 0.001^{*}$). **Conclusion**: using the snuff box technique in arterial blood sampling has better clinical outcomes. **Recommendation**: using the snuff box technique in arterial blood sampling, include the snuff box technique in nurses' curriculum and training workshops.

Keywords: anatomical snuff box technique, arterial blood sampling, clinical outcomes, patient

1. Introduction:

Management of all patients depends on proper diagnosis which consists of gathering complete health history, comprehensive physical examination, and different diagnostic studies. Blood sampling is a simple minor invasive procedure used for diagnosis as well as in follow up of patient's prognosis and effect of management. Many techniques are used in obtaining blood samples including venipuncture, arterial puncture, and fingerstick sampling **(Hoffman M et al., 2023).**

Arterial blood samples are indicated mainly to assess arterial blood gas (ABG) which is a blood obtained from an artery mainly to measure the levels of oxygen content, hemoglobin, oxygen saturation, partial pressure of oxygen, partial pressure of carbon dioxide, pH and bicarbonate level **(Kitamura & Sarko, 2014, Castro D et al., 2022))**. Arterial blood gas sample is needed in many conditions such as acute respiratory distress syndrome, severe sepsis, and hypovolemic shock, it is also required in diabetic ketoacidosis, acute respiratory failure, heart failure, cardiac arrest and bronchial asthma (**Castro& Keenaghan, 2019)**.

However, other blood tests as serum electrolytes and complete blood count can be done from arterial blood sample to decrease number of punctures in cases like venous access difficulties or history of intravenous drug abuse **(World Health Organization, 2010, Gupta S et al., 2016).**

Radial artery puncture remains the method of choice for arterial blood sampling (**World Health Organization, 2010).** The radial artery is most easily accessible medial to the radial styloid process and lateral to the flexor carpi radialis tendon, 2-3 cm proximal to the ventral surface of the wrist crease (**Danckers et al., 2023).**

Although it is a safe procedure, complications may occur during radial artery puncture with a reported rate limited to < 5% **(Weiner et al., 2016).** The well-known complications that may be encountered include temporary arterial occlusion, permanent ischemia, local infection, bleeding, hematoma formation and pain **(Ungureanu et al., 2020).**

An advanced technique of obtaining arterial blood samples has been used recently during COVID-19 pandemic, it has low risk of vascular complication and allow a faster and easier blood sampling, it is the distal radial access which is also called "Snuffbox" access. **(Ungureanu et al., 2020).**

The anatomical snuff box is a triangular depression on the dorsum of the hand and surrounded laterally and medially by extensor tendons and trapezium carpal bones. Because the radial artery in the anatomic snuffbox has some collateral branches, ischemia of the hand and occlusion risk is decreased. There is faster homeostasis if compared to conventional radial artery access site because of the effect of surrounding tendons, besides the lesser risk for compartment syndrome **(Corcos, 2019).** This technique was used in coronary catheterization, neuroendovascular procedures **(Kar, 2019, Hull et al., 2020** and **Rigatelli et al., 2022).**

Nurses and physicians are the healthcare providers who obtain arterial blood sample in operating room, different medical-surgical wards, intensive care and critical care units, pain settings and pulmonology units, where the results are the corner stone of patient management plan **(Blum et al., 2015)**, therefore professional medical staff including nurses should have traditional as well as the advanced clinical skills of obtaining this sample to overcome the contraindications and minimize possible complications and discomforts.

Obtaining arterial blood sample can be challenging for professional nurses in patients with poor identified pulse, obese and those with joint disorders or arteriosclerosis of peripheral arteries. For years, the most commonly used technique is the traditional radial artery site **(Danckers & Fried, 2016** and **Xiong et al., 2022).**

1.1. Operational Definitions:

Patients' clinical outcomes are: patients' vital signs, pain severity, and vascular access site complications namely; neurovascular compromise, hematoma, and vascular site bleeding.

1.2. Significance of the study

To the best of our knowledge, snuffbox technique was investigated in coronary catheterization **(Kar, 2019)**, currently it was investigated by **(Ungureanu et al., 2020)** for ABG sampling who studied the success rate and hemostasis, and they reported limitations of their results due to having samples only in emergency rooms . Data from other medical surgical settings like hemodialysis was reported by **(Hull et al., 2020)**, as they were concerned by hemostasis too. Data from nursing research is not available as the technique is recently recommended.

Hence, the current study aims to determine the effect of using the anatomical snuffbox technique versus the traditional method in obtaining arterial blood samples and its possible patients' clinical outcomes, which will enrich the nursing practice in different medical-surgical nursing specialties and settings.

2. Aim of the study

The present study aims to evaluate the effect of using anatomical snuffbox technique in arterial blood sampling on patients' clinical outcomes.

Hypothesis

H1: Patient who will undergo arterial blood sample through anatomical snuffbox technique will exhibit average vital signs than those who will not.

H2: Patient who will undergo arterial blood sample through anatomical snuffbox technique will report less pain than those who will not.

H3: Patient who will undergo arterial blood sample through anatomical snuffbox technique will have less local vascular access site complications than those who will not.

3. Subjects and Methods

3.1. **Research Design**: Quasi experimental research design was used (two groups: control and study groups) was used to conduct the present research.

3.2. **Setting**

This study was conducted in recovery room of cardiac catheterization unit and neurosurgery wards in Damanhour National Medical Institute, El Beheira Governorate, affiliated to the general organization for teaching hospitals and institutes-Ministry of Health and Population- Egypt. This setting provides public non-paid services.

3.3. **Subjects**

A purposive sample of 60 adult patients was recruited for the study in the above-mentioned settings; it was divided equally and randomly into study and control groups with 30 patients in each group. Sample size was calculated using Epi info Program version 7 as the following: target population 70 per 3 months, expected frequency = 50%, acceptable error = 5%, confidence interval = 95% and minimum sample size = 59. The eligibility criteria for this study were m and female patients who were undergoing arterial blood sampling with stable medical conditions as chronic obstructive pulmonary disease, road traffic accident, cerebrovascular stroke and undergone cardiac catheterization, age ranged from 20 to 60 years old, fully conscious, and able to communicate verbally and had positive Allen's test in both arms. Whereas patients who have pain or hematoma in the selected hand for blood sampling . And patients who have trauma, infection, skin diseases or burn in the upper limbs, and those with coagulopathies or receiving anticoagulants **(Kitamura & Sarko, 2014)** where excluded from the study.

3.4. Data Collection Tools:

Three tools were used for data collection.

Tool 1: " Patient's Personal and Clinical Data Sheet "

It was developed by the researchers based on comprehensive reviewing of the related literature. It was used to collect data regarding patient's age, gender, level of education, marital status, place of residence, occupation, current health status and smoking condition.

Tool 2: "**Patient's Clinical Outcomes Assessment Questionnaire**"
It was developed by the researchers based on the relevant reviewed literature **(Ebeed, Khalil & Ismaeel, 2017, Reich et al., 2018, Sapra et al., 2022 and Abozaid et al., 2021)** to collect clinical data before and after drawing the sample. It was comprised of three parts:
Part one: Vital signs recordings which included items regarding values of temperature, pulse, respiration and blood pressure.
Part two: Vascular access site assessment which included neurovascular condition of the involved limb in terms of color, skin temperature, capillary refill, radial pulse, presence of distal edema, distal sensation and distal movement.
Part three: Post arterial sampling complications' assessment, it was used to assess presence of hematoma and vascular site bleeding, and duration of manual pressure to achieve hemostasis.

Tool 3: Numerical pain rating scale (0-10)

It was adopted from numerical pain scale used by **(Boonstra et al., 2016)**, it was used assess level of pain at access site of blood sampling. The scoring system used was 0=no pain, 1-3 = mild pain, 4-6=moderate pain and 7-10= severe pain.

3.5. Ethical considerations:

An official approval to conduct the study was obtained from Dean of faculty of nursing-Damanhour university, and the authorized personal in Damanhour National Medical Institute. Ethical Committee approval was obtained to conduct the study from Faculty of Nursing, Damanhour University, Egypt. No. 66-a signed on 17-11-2022. The aim of the study was explained to all the studied patients. All the studied patients gave an informed consent form before participating in the study. Privacy and confidentiality were assured. Patients were

informed that they had the right to withdraw from the study at any time without any drawbacks. A code number was used instead of names.

3.6. Methods of data collection:

- Tools I and II were developed by the researchers after reviewing the related literatures.
- Tools were checked for content validity by a jury of five experts in Medical-Surgical Nursing and vascular surgeons, their suggestions were taken into consideration.
- An official permission to conduct the study was obtained from the authorized personal of Damanhour National Medical Institute hospital, recovery room of cardiac catheterization unit and neurosurgery wards in Damanhour National Medical Institute hospital.
- Pilot study was carried out on 10% of the sample (6 patients) to ensure the clarity and applicability of the tools, the necessary modifications were done. Those patients were excluded from the study.
- The reliability of tool II was tested by using Cronbach's Alpha test, the Cronbach's coefficient alpha was 0.87, which was accepted as reliable.
- The patients were randomly and equally assigned to control and study groups.
- Tools I, II part 1 and 2 were used to collect data about patients' personal and clinical profile for both groups before drawing of the arterial blood sample.
- Traditional radial approach was used to collect arterial blood sample from the control group, while snuffbox technique was used for drawing the arterial blood sample from the study group.
- Explanation of the procedure, aim and expectations were all given to all patients in both groups.
- Implementation of the study was as follows for all patients in both control and study groups:

- Explain the purpose and the steps to the patient.
- Position the patient relaxed in flat position, or in side lying or sitting with support for those who were unable to lie in flat position
- Hand washing and wearing gloves.
- Prepare the heparinized syringe.
- Verify positive Allen's test.
- Disinfection of the sampling site with 70% alcohol and allowing it to dry; in traditional radial technique the site was (thumb side of the wrist where the radial pulse was felt) ; while in Snuffbox technique, the site was the superficial depression in the skin that made when the thumb is in abduction and the wrist in ulnar deviation.
- *For traditional radial arterial blood sample* **(World Health Organization, 2010):**
    - ✓ Palpation of the radial pulse to locate site of aspiration of the blood sample.
    - ✓ Insertion of the needle at a 45-degree angle and aspiration of the blood sample.
- *For Snuffbox technique for study group* **(Ungureanu et al., 2020)**:
    - ✓ To bring the artery to the surface of the fossa, the patient was asked to grip his thumb under the other four fingers, with the hand slightly abducted.

- ✓ Palpation of the anatomical snuff box to locate the radial pulse.
- ✓ Insertion of the needle at a 30–45-degree angle, then advancing it slowly, proximally towards the radial artery and the index over the maximal arterial pulsation area.

- Withdrawal of the needle and syringe; place a clean, dry gauze over the site and apply firm pressure sufficiently to stop bleeding.
- The pressure was manually applied over the site and ranged from 5 to 20 minutes in the control group, and from 5 to 10 minutes in the study group.

- Tool II and III were used to assess patients in both groups immediately after drawing the arterial blood sample.
- Data was collected by the researchers, over a period of three months starting from April 2023 to June 2023.

3.7. **Statistical Analysis:**

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. Significance of the obtained results was judged at the 5% level. The used tests were Chi-square test for categorical variables to compare between different groups and Fisher's Exact or Monte Carlo correction. Correction for chi-square when more than 20% of the cells have an expected count less than 5.

3.8. **Limitations:**

- Not considering body mass index were in data collection as a factor that may interfere with the results.
- Some nurses and patients in the mentioned settings did not accept snuff box technique as it is new technique for them.

4. Results

Table (1) presented that patients in control group were considered similar to the study group in terms of age, gender, education, marital status, residence, and occupation with no statistically significant differences between them. Notably, both groups were ≥30 to 60 years old, slight dominance was observed in the study group in the following; males (53.3%), those can't read and write (56.7%), housewives (26.7%), furthermore the majority was married (80%).

Table (2) showed that nearly half of subjects in both groups had no comorbidities and didn't use any current medications with a higher percent in control group (53.3%) compared to (40.0%) in the study group. The most prevalent associated disease among those who had was diabetes mellitus with precents of (36.7%, 33.3%) in control and study group respectively, followed by hypertension with percents of (10.0%, 16.7%). Additionally, there was statistically significant difference between both groups as regards the use of corticosteroids as it was used by (23.3%) of the study group compared to none in the control group; (p =0.011*). As regards smoking history, smokers were higher in study group than in controls with percentages of (30%, 10%) respectively.

Table (3) concerning vital signs assessment, this table shows no statistically significant differences between both groups either before or after procedure, and that all subjects in both groups had the average body temperature. Considering other vital signs, the differences weren't significant.

Table (4) reveals that both groups had no statistically significant differences as regards their vascular access site assessment. On the other hand, the subjects in the study group showed statistically significant lesser duration in applying manual pressure to achieve hemostasis; the

vast majority of them (93.3%) required < 5minutes compared to (36.7%) of those in the control group, (p<0.001*).

Table (5) depicts the pain scores and complications after drawing the sample in both groups, concerning pain scores, study group had a higher statistically significant percent of those reported mild pain (86.7%) compared to (36.7%) in control group, besides, all study group had no hematoma compared to three-fifths (60.0 %) in control group, moreover, the vast majority (90.0%) in the study group compared to (46.7%) in control group had no oozing . A statistically significant differences were found between the study and control group as regards pain, hematoma, and bleeding (p = 0.001*>, 0.001*>, 0.001) respectively.

Table (1): Distribution of the control and study groups according to their personal and clinical data

Patients' personal and clinical data	Control (n = 30)		Study (n = 30)		χ^2	p
	No.	%	No.	%		
Age in years						
20- < 30	0	0.0	0	0.0	0.797	^{MC}p= 0.791
30 - < 40	2	6.7	4	13.3		
40- < 50	8	26.7	8	26.7		
50- 60	20	66.7	18	60.0		
Gender						
Male	13	43.3	16	53.3	0.601	0.438
Female	17	56.7	14	46.7		
Level of education						
Can't read or write	16	53.3	17	56.7	1.936	^{MC}p= 0.610
Primary	10	33.3	6	20.0		
Secondary	3	10.0	5	16.7		
University	1	3.3	2	6.7		
Marital status						
Single	1	3.3	0	0.0	1.892	^{MC}p= 0.373
Married	20	66.7	24	80.0		
Widowed	9	30.0	6	20.0		
Place of residence						
Urban	10	33.3	10	33.3	0.000	1.000
Rural	20	66.7	20	66.7		
Occupation						
Office/desk worker	0	0.0	1	3.3	4.727	^{MC}p= 0.251
Manual	6	20.0	7	23.3		
Housewife	4	13.3	8	26.7		
Retired	0	0.0	1	3.3		
Not working	20	66.7	13	43.3		

χ^2: Chi square test **MC: Monte Carlo**

p: p value for comparing between the two studied groups

Table (2): Distribution of the control and study groups according to their current health status and smoking history.

Current health status	Control (n = 30)		Study (n = 30)		χ^2	p
	No.	%	No.	%		
Presence of associated diseases						
None	16	53.3	12	40.0	1.071	0.301
Diabetes mellitus	11	36.7	10	33.3	0.073	0.787
Cardiac disease	1	3.3	5	16.7	2.963	^{FE}p=0.195
Respiratory diseases	1	3.3	2	6.7	0.351	^{FE}p=1.000
Hypertension	3	10.0	5	16.7	0.577	^{FE}p=0.706
Current used medications^						
None	16	53.3	12	40.0	1.071	0.301
Antidiabetics	11	36.7	10	33.3	0.073	0.787
Beta blockers& Vasodilators	1	3.3	4	13.3	1.964	^{FE}p=0.353
Bronchodilators	1	3.3	2	6.7	0.351	^{FE}p=1.000
Antihypertensive	3	10.0	5	16.7	0.577	^{FE}p=0.706
Analgesics	0	0.0	2	6.7	2.069	^{FE}p=0.492
Corticosteroids	0	0.0	7	23.3	7.925*	^{FE}p=0.011*
Antiplatelets	0	0.0	3	10.0	3.158	^{FE}p=0.237
Smoking						
Non-smokers	22	73.3	17	56.7	3.698	^{MC}p= 0.168
Quitters	5	16.7	4	13.3		
Smokers	3	10.0	9	30.0		

^ More than one answer was selected among those who have.

χ^2: Chi square test MC: Monte Carlo FE: Fisher Exact

p: p value for comparing between the two studied groups *: Statistically significant at p ≤ 0.05

Table (3): Distribution of the control and the studied group according to their vital signs

Vital signs assessment	Control (n = 30)				Study (n = 30)				χ^2 (p_1)	χ^2 (p_2)
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
Temperature										
Average	30	100.0	30	100.0	30	100.0	30	100.0	–	–
Hyperthermia	0	0.0	0	0.0	0	0.0	0	0.0		
Hypothermia	0	0.0	0	0.0	0	0.0	0	0.0		
Heart rate										
Average	30	100.0	30	100.0	29	96.7	29	96.7	1.017 (^{FE}p= 1.000)	1.017 (^{FE}p= 1.000)
Tachycardia	0	0.0	0	0.0	1	3.3	1	3.3		
Bradycardia	0	0.0	0	0.0	0	0.0	0	0.0		
Respiratory rate										
Average	29	96.7	29	96.7	30	100.0	30	100.0	1.017 (^{FE}p= 1.000)	1.017 (^{FE}p= 1.000)
Tachypnea	1	3.3	1	3.3	0	0.0	0	0.0		
Bradypnea	0	0.0	0	0.0	0	0.0	0	0.0		
Blood Pressure										
Average	27	90.0	27	90.0	29	96.7	29	96.7	1.071 (^{FE}p= 0.612)	1.071 (^{FE}p= 0.612)
Hypertension	3	10.0	3	10.0	1	3.3	1	3.3		
Hypotension	0	0.0	0	0.0	0	0.0	0	0.0		

FE: Fisher Exact **χ^2: Chi square test**

p_1: p value for comparing between the two studied groups in pre periods

p_2: p value for comparing between the two studied groups in post periods

Table (4): Distribution of the control and the studied group according to their vascular access site assessment.

Vascular access site assessment of the involved hand	Control (n = 30)				Study (n = 30)				χ^2 (p_1)	χ^2 (p_2)
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
Color										
Pink	24	80.0	24	80.0	27	90.0	27	90.0	1.176 (^{FE}p= 0.472)	1.176 (^{FE}p= 0.472)
Pallor	6	20.0	6	20.0	3	10.0	3	10.0		
Cyanosis	0	0.0	0	0.0	0	0.0	0	0.0		
Temperature										
Warm	27	90.0	27	90.0	28	93.3	28	93.3	1.888 (^{MC}p= 0.615)	1.888 (^{MC}p= 0.615)
Hot	3	10.0	3	10.0	1	3.3	1	3.3		
Cold	0	0.0	0	0.0	1	3.3	1	3.3		
Capillary refill										
≤2 second	29	96.7	29	96.7	30	100.0	30	100.0	1.017 (^{FE}p= 1.000)	1.017 (^{FE}p= 1.000)
>2 seconds	1	3.3	1	3.3	0	0.0	0	0.0		
Radial pulse										
Strong	27	90.0	27	90.0	30	100.0	30	100.0	3.158 (^{FE}p= 0.237)	3.158 (^{FE}p= 0.237)
Weak	3	10.0	3	10.0	0	0.0	0	0.0		
Absent	0	0.0	0	0.0	0	0.0	0	0.0		
Edema										
Present	7	23.3	7	23.3	3	10.0	3	10.0	1.920 (0.166)	1.920 (0.166)
Absent	23	76.7	23	76.7	27	90.0	27	90.0		
Sensation										
Present	28	93.3	28	93.3	30	100.0	30	100.0	2.069 (^{FE}p= 0.492)	2.069 (^{FE}p= 0.492)
Numbness	2	6.7	2	6.7	0	0.0	0	0.0		
Absent	0	0.0	0	0.0	0	0.0	0	0.0		
Movement										
Normal	30	100.0	30	100.0	30	100.0	30	100.0	–	–
With limitation	0	0.0	0	0.0	0	0.0	0	0.0		
Duration of manual pressure to hemostasis	**No.**		**%**		**No.**		**%**		χ^2	
<5 Minutes	11		36.7		28		93.3		21.595* (^{MC}p <0.001*)	
5- <10 Minutes	13		43.3		2		6.7			
10- <15 Minutes	5		16.7		0		0.0			
≤15Minutes.	1		3.3		0		0.0			

χ^2: Chi square test **MC: Monte Carlo** **FE: Fisher Exact**

p_1: p value for comparing between the two studied groups in pre periods

p_2: p value for comparing between the two studied groups in post periods

Table (5): Distribution of control and study group according to their pain scores and complications after sampling

Pain	Control		Study		χ^2	p
	No.	%	No.	%		
No pain (0)	0	0.0	0	0.0	15.943*	MCp 0.001*<
Mild pain (1-3)	11	36.7	26	86.7		
Moderate pain (4-6)	15	50.0	3	10.0		
Sever pain (7-10)	4	13.3	1	3.3		
Hematoma						
No hematoma	18	60.0	30	100.0	15.407*	MCp 0.001*<
Minor hematoma ≤5cm	9	30.0	0	0.0		
Major hematoma >5cm	3	10.0	0	0.0		
Vascular site bleeding						
No oozing (dry dressing)	14	46.7	27	90.0	13.195*	MCp= 0.001*
Mild oozing (< 2cm^2)	12	40.0	3	10.0		
Moderate oozing (2< 5cm^2)	4	13.3	0	0.0		
Severe oozing (5≤ 10 cm^2)	0	0.0	0	0.0		

χ^2: Chi square test MC: Monte Carlo

p: p value for comparing between the two studied groups *: Statistically significant at p ≤ 0.05

5. Discussion:

The technique "trans-snuff box access" is easy to identify **(Rasul et al., 2018),** besides it is applied safely without the need for prior procedure assessment of dual hand circulation. **(Aldoori &Mohammed, 2019)**. Considering this, **(Shan-Shan et al., 2022)** have reported that distal trans-radial access (dTRA) had a highly success rate especially when performed by experts , the technique and its relevant published studies were limited to interventional long procedures. **(Kolkailah et al. 2018, Kim et al., 2018, Kar, 2019, Aldoori & Mohammed, 2019, Hull et al., 2020), and Bardooli & Kumar, 2023).**

In the rapidly evolving medical field, innovative skills in nursing and enhancing the profession's core competitiveness are paramount for nursing growth and broader advancement **(Yang et al.,2023)**. Medical-Surgical nurses during the COVID-19 pandemic were prone to collect ABG samples more frequently as routine care. In this regard, **(Meng et al., 2021)** have stated that commonly arterial samples are collected in the acute settings like operating theaters for certain laboratory investigations . However little is captured by literature **(Meng et al., 2021 and Singh et al., 2022)**. Besides, anesthesia, surgery, and critical care teams are currently used to have arterial samples from the arterial catheters for investigations like chemistry and immunoassays **(Meng et al., 2021)**. Implicitly, nurses may benefit from these results in their day-to-day practice while having ABG samples in OR, burn

units, or wards in different medical surgical specialties for patients with difficult phlebotomy access., more clinical studies are needed to provide more theoretical evidence about the effect of using snuff box technique in arterial blood sampling on patients' clinical outcomes for the clinical popularization of this approach for nurses.

The present study revealed that subjects were in middle adulthood which is expected as this is the stage of chronic illness onset through the lifespan, also, they were recruited from inpatient departments. Besides, more than half couldn't read or write, weren't working, they came from rural areas. The specialized free health services provided by the setting attract the rural residents especially those who weren't working and housewives. As noticed, the most prevalent associated disease, among those who had, was diabetes mellitus which is congruent with the **(International Diabetes Federation, 2019)** as it declared that diabetes mellitus, especially, type 2 diabetes affects people in low- and middle-income countries).

As for vital signs assessment, all subjects in both groups had the average body temperature. Considered vital signs, namely pulse and blood pressure, the differences traced weren't significant, this could be interpreted by that the researcher applied the snuff box technique for sample drawing which is very time-limited by getting the blood only.

Both groups had no statistically significant differences as regards their vascular access site assessment. However, the results were in favor of the study group in terms of neurovascular status. This might refer to presence of dual hand blood supply confirmed before the procedure that limited the risk for ischemia (**Kolkailah et al., 2018)**, added to this the higher percent of hypertensive patients in the study group than those in the controls, comes in agreement with that of **(Shan-Shan et al., 2022)** who studied the success rate of dTRA among patients who underwent cardiac catheterization, they reported a positive correlation between the technique success rate and hypertension, they further refer this to the compensatory increase of the distal radial artery internal diameter, and losing elasticity of arterial wall among hypertensive patients which decrease the arterial compliance and increase the vascular diameter. They also added another factor which is the distal radial artery's strong pulsation in hypertensive patients which enables a better feeling for puncture.

Regarding achieving hemostasis post-procedure, generally speaking **(Pancholy et al., 2015)** have reported several practices for hemostatic compression ranging from simple manual compression to titratable pressure circumferential bands, however, using snuff box radial access **(Hull et al., 2020)** cited that hemostasis is achieved by having the trapezium and scaphoid to push against in this technique. This can interpret the statistically significant lesser duration in applying only manual pressure to achieve hemostasis; the vast majority of study subjects required < 5 minutes compared to slightly more than one-third in controls, this may relate to that all our subjects weren't receiving anticoagulants, also, a fair percent of them had no comorbidities and consequently they didn't use any current medications.

As for clinical outcomes, pain scores after drawing the sample in the study group showed a statistically significant and higher difference between those who reported mild pain than those in controls, this might relate to the higher use of corticosteroids among the study group, and the decreased likelihood of exposure to nerves/nerve ending through passing the snuff box as cited earlier by **(Deora et al., 2021).**

Regarding hematoma, **(Shan-Shan et al., 2022)** mentioned that the liability of radial artery for spasms which may result in failed puncture, and inappropriate compression after puncture may cause hematoma and serious consequences. Concerning this, the entire study group had no hematoma compared to three-fifths of controls, which can be interpreted by the

higher prevalence of males and hypertension among study subjects than controls which was supported by **(Kim et al., 2018)** who mentioned that the distal radial artery diameter is smaller in females, than in males. On the other hand, the results reported by (**Shan-Shan et al., 2022)** proved a negative correlation of the dTRA success and being females and having diabetes mellitus. They interpreted this by the atherosclerosis intimal fibers hyperplasia, calcification of the middle arterial wall layer among diabetic patients which lead to a narrowing of the lumen, accordingly, a reduction of the distal radial diameter which in turn leads to a reduction in the dTRA success rate, consequently complications like hematoma and bleeding might increase.

Moreover, the vast majority in the study group compared to less than half of the controls had no oozing with a statistically significant difference. Nevertheless, one-tenth of the study group were receiving antiplatelet compared to none among controls, also, smokers were higher in the study group than controls. These results support the advantage of using the technique even though risk factors (**Langsted & Nordestgaard, 2019)** for bleeding are present as long as the procedure is blood sampling.

Inferences from the present study are encouraging in using the snuff box technique than the traditional technique when collecting arterial blood sampling to minimize discomforts ana complications thus improve patients' clinical outcomes and satisfaction as well. At the same time, these results of using snuff box technique can benefit the health institution.

6. Conclusion

Based on the current study, the conclusion is that using the snuff box technique in arterial blood sampling has better clinical outcomes namely; average vital signs, less time to achieve hemostasis post-procedure, furthermore, lesser pain at access site of blood sampling and lesser complications including no hematoma formation, and milder oozing on the access site than using traditional radial arterial blood sample.

7. Recommendations

In the light of the findings obtained from the current study, the following recommendations are suggested:

- Using the snuff box technique in arterial blood sampling and in cases with difficult venous access after consulting clinical anesthesiologist.
- Include the snuff box technique in nurses' curriculum and training workshops as a substation for traditional arterial blood sampling techniques.
- Replication of the study on a large scale to evaluate the technique on patients with different comorbidities and in the presence of edema.
- Determinants of the snuff box technique failure as for blood sampling.

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الملخص العربى

تأثير استخدام تقنية صندوق المسعط التشريحي (الحفرة الشعاعية) في أخذ عينات الدم الشرياني على النتائج السريرية للمرضى

مقدمة: تقنية صندوق السعوط التشريحي (الحفرة الشعاعية) هي تقنية متقدمة للحصول على عينة من الدم الشرياني تم استخدامها مؤخرًا، وتتميز بانخفاض خطر حدوث مضاعفات الأوعية الدموية وتسمح بأخذ عينات دم بشكل أسرع وأسهل. نظرًا لأن الشريان الكعبري الموجود في صندوق السعوط التشريحي يحتوي على بعض الفروع الجانبية، فإن خطر نقص تروية اليد والانسداد ينخفض.

أهداف البحث:هدفت الدراسة إلى تقييم تأثير استخدام تقنية صندوق السعوط التشريحي في أخذ عينات الدم الشرياني على النتائج السريرية للمرضى.

مكان البحث: معهد دمنهور الطبى القومى.

افتراضات البحث: H1 : المريض الذي سيخضع لعينة من الدم الشرياني من خلال تقنية صندوق السعوط التشريحي سيظهر علامات حيوية متوسطة مقارنة بأولئك الذين لن يفعلوا ، H2 : المريض الذي سيخضع لعينة من الدم الشرياني من خلال تقنية صندوق السعوط التشريحي سيشعر بألم أقل من أولئك الذين لن يفعلوا ذلك،H2 : المريض الذي سيخضع لعينة من الدم الشرياني من خلال تقنية صندوق السعوط التشريحي سيكون لديه مضاعفات أقل في موقع الوصول إلى الأوعية الدموية من أولئك الذين لن يفعلوا ذلك.

عينة و طرق البحث: شملت عينة البحث 60 مريض ، ، قد تم استخدام تصميم بحث شبه تجريبى من مجموعتين مجموعة التحكم ومجموعة الدراسه.

أدوات الدراسة: تم استخدام ثلاث ادوات لجمع: الأداة الأولى: "الملف الشخصي والسريري للمرضى"، الأداة الثانية: "استبيان تقييم النتائج السريرية للمرضى" والأداة الثالثة: "مقياس تصنيف الألم العددي".

النتائج: أظهرت النتائج ان مجموعة الدراسة أظهرت مدة أقل ذات دلالة إحصائية في تطبيق الضغط اليدوي لتحقيق وف النزيف؛ احتاجت الغالبية العظمى منهم (93.3%) إلى أقل من 5 دقائق مقارنة بـ (36.7%) في مجموعة التحكم (P<0.001*). وجدت فروق ذات دلالة إحصائية بين مجموعة الدراسة والسيطرة فيما يتعلق بالألم، التجمع دموي، والنزيف (P = 0.001 *).

الخلاصة: خلُص البحث الحالي الى ان استخدام تقنية صندوق السعوط في أخذ عينات الدم الشرياني له نتائج سريرية أفضل.

التوصيات: أوصت الدراسة باستخدام تقنية صندوق السعوط في أخذ عينات الدم الشرياني، إدراج تقنية صندوق السعوط في مناهج الممرضات و ورش العمل التدريبية.