Review Article

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# New Technique to Verify Permeability and Anorectal Malformations, and Take Rectal Temperature in Neonates And Infants

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## ABSTRACT

*The first neonatal examination should be carried out from the delivery room to assess: 1. Initial neonatal well-being; 2. Vital signs at birth; 3. Somatometry; 4. Complete physical examination; 5. Verify anorectal permeability and 6. Detect congenital malformations, including Anorectal Malformations. The Clinical Practice Guideline and the experts in Anorectal Malformations recommend detection by introducing a rectal thermometer through the anus with which, at the same time, the rectal temperature is taken. However, there is no real well-structured technique for such a procedure. In Mexico, Latin America, and in countries with limited resources, a large part of the personnel who care for newborns, including doctors, nurses, and students, take rectal temperatures "in their own way" SIC, unaware of "a technique" and the "true objective" of this procedure, generating detection failure and risk of injuring the distal digestive tract by carrying out the procedure empirically and by the incorrect use of thermometers to take the rectal temperature. This issue has not been addressed for more than three decades nor has the way of **1.** Checking anorectal patency changed; **2.** Detect anorectal malformations; **3.** Take the rectal temperature in neonates and infants. For this reason, our objective is to publicize our "New Technique to Verify Permeability and Anorectal Malformations and take the rectal temperature in neonates and infants", with which we carry out these three actions with a single non-empirical procedure of a scientifically medical nature.*

## Keywords

Rectal atresia, First neonatal examination, Anorectal malformations, Rectal temperature taking.

## Introduction

In public and private medical practice in our setting, newborn care in the delivery room is generally performed by nurses and doctors in training. Neonatal care from the delivery room must assess six aspects:

1. Initial neonatal well-being.
2. Vital signs at birth, including rectal temperature.
3. Somatometry.
4. Complete physical examination.
5. Verify Anorectal Patency (VAP).
6. Detect congenital malformations, including Anorectal Malformations (ARM).

For at least three decades, it has been taken for granted that taking a rectal temperature (TRT) in neonates is sufficient to VAP and detect ARM. However, there is no true technique for this procedure, which is performed empirically with the "known technique" (KT) for TRT, which is widely unknown by health personnel, so each person performs it "in their own way", "as they learned" SIC, which generates:

1. Relative certainty that the recorded temperature is truly rectal.
2. Incorrect VAP.
3. Incorrect detection of ARM.
4. Risk of anorectal injuries due to the incorrect use of thermometers in this way.
5. Lack of real technique for these procedures.

## Justification

It is desirable to have a real, clear, simple technique, at no cost and

for routine and universal application, not only for a correct TRT from the delivery room, but, as its main objective, for VAP and correctly detecting ARM, but above everything, to avoid anorectal injuries with the incorrect use of thermometers for this way.

In Mexico, with 2,500,000 births per year, ARM are the second cause of digestive tract malformations, after lip and palate defects. Its prevalence is 1:3,500-5,000 live births, with a total of 625 new cases per year [1,2]. For the diagnosis of ARM, Mexico, Latin America, and developing countries share the guidelines given by:

1. ARM experts.
2. The Clinical Practice Guide for diagnosis and treatment of ARM in the neonatal period (CPGDTARM).
3. The Program for the Early Detection of Birth Defects (PEDBD).
4. The "technique" for TRT.

These guidelines have not changed for three decades. We call them "Known Technique" (KT) since they all share similarities, such as mentioning without details, how to perform each procedure. This justifies, in part, that everyone performs it "in their own way" or empirically.

1. Experts mention that inserting the exploring thermometer less than 3 cm may not diagnose VAP, and may miss, Rectal Atresia (RA) [1,2].
2. The CPGDTARM mentions as anorectal impermeability or suspicion of RA, the impossibility of introducing a probe or a " rounded instrument" in approximately 3 cm [3]. They do not mention what type of probe or rounded instrument to use, nor its size or caliber, nor how to introduce it.
3. The PEDBD indicates to gently insert a thermometer into the rectum 1 to 2 cm. (Figure 1)
4. The most universally disclosed and unclear technique for TRT (4-8) is unknown by the majority of health personnel in our environment, to whom we conducted a theoretical-practical survey of 650 health providers.

The KT (4-8) is as follows:

- Put a small amount of lubricant, such as petroleum jelly, on the end of the thermometer and on your child's bottom.
- Place your child belly down across your lap or on a firm surface. Another way is on the back with the legs pulled up to the chest. Turn the thermometer on and slide it 1/2 inch (for babies less than 6 months old) to 1 inch into the anus. Be gentle. There should not be any resistance. If there is, stop. Hold your child still. Leave the thermometer in place until it beeps. Then remove and check the digital reading.
- Thermometers should be disinfected before and after use with disinfecting soap and water or disinfecting alcohol swab.
- Label the rectal thermometer so it is not accidentally used in the mouth [4-8] (Figure 1).

With this KT, we cannot control the force, depth, and manner of inserting the rectal thermometer, nor are we certain that the thermometer reaches the rectum or passes it, which carries a risk of injury, or that, it remains in the anus if we only introduce the tip (1 cm or less).

Experts recommend rectal temperature to diagnose fever [9], although it is not the "gold standard" but better represents core body temperature [10] than axillary, oral, tympanic, and frontal temperatures, and can be taken interchangeably with a rectal thermometer, or an axillary glass thermometer [11-13]. However, we advise against using them interchangeably, because it implies ignoring the parts that make up the thermometers and the differences between the different types of thermometers. These are:

1. Tip, Bulb, or Reservoir. Where the Galinstan (an alloy of gallium, indium, and tin), the oil or the mercury stays, in the glass ones. In digital ones, the temperature sensor [7].
2. Body or stem. Is where the capillary through which Galinstan, oil, or mercury flows, in glass ones. In the digital ones the digital screen [7].

**Figure 1:** "KT" for neonatal TRT. "KT" for detection of ARM (Step 12), VAP, and TRT.

3. Tail. The final part of the thermometer is rounded in the glass ones and quadrangular in the digital ones.

The tip, bulb, or reservoir, is the most important part of a thermometer. In the glass rectal thermometer, it is short, thick, and rounded to half a sphere, 0.5 cm in diameter and in length. In the axillar glass thermometer, is long (0.8-1 cm), thin (0.3 cm), and pointed, susceptible to breaking easily and injuring the anus and rectum, therefore we advise against using it rectally (Figure 2). In digital ones, it is similar to that of a glass rectal thermometer [7] (Figure 3).

The body or stem. In those made of glass, it is generally triangular prismatic, 0.5 cm in diameter and 10 cm long, or cylindrical with larger dimensions (Figure 2). In digital ones it is generally rectangular and thick, 0.8x1.5x10 cm (Figure 3).

The tail. In glass ones, it is rounded. In the digital ones, it is rectangular [7].

Almost 2 decades ago (2005), we created and used our "New Technique" (NT), first, for VAP; second, to detect ARM; third, for TRT in neonates and infants under 3 years of age, to diagnose fever.

It differs from KT in that with NT we can control:
1. Insertion force.
2. Insertion depth.
3. Certainty that the tip of the thermometer reaches the rectum.
4. Reliable and correct VAP.
5. Correct detection of ARM, mainly AR.
6. Risk of injuring the anus and rectum that is nil.

## Objetive

Make our NT known for VAP, Detection of ARM and TRT created with technical and scientific support with which, with a single procedure, we can perform three aforementioned actions and diagnoses.

## Description and scientific foundation of the NT

1. We must have a digital thermometer or a glass rectal thermometer with Galinstan or oil, without mercury. Place a "witness mark" with adhesive tape or a marker, at a distance of at least three centimeters from the tip towards the body [1-3,9,14], measured with a tape measure, as the insertion limit per the anus of the newborn, to verify that it is inserted 3 cm and avoid inserting it more or inserting it less.
2. Hold the thermometer with only three fingers: thumb, index, and middle of the dominant hand, from the three cm mark, towards the body. The fingers also serve as an insertion stop (Figure 2). Holding it like this, and not from the tail and with more than three fingers, as is usually held, has two objectives:

1. Reducing the insertion force, to decrease the risk of injuring the normal anus and rectum, and to avoid perforating a deep rectal obstruction, such as RA. In both situations, we would have apparently permeable cases, or “false negatives”. To stop if there is resistance.
2. In order not to insert it more than 3 cm, because we would record the sigmoid or peritoneal temperature in case of perforating the intestine, and not to introduce it less than 3 cm, because we would record the anal temperature, not the rectal one. In both cases the VAP, the detection of ARM, and TRT are incorrect.
3. Keep the thermometer inserted for three minutes [11,14-17], (maximum expansion time of mercury, oil, or Galinstan), up to the three fingers, without releasing it, or until the alarm or beep of the digital thermometer sounds [4-8]. This ensures accurate recording of rectal temperature (Figures 2 and 3).
4. The explorer should do the following:

α. Wear gloves.
β. Lower the Galinstan, oil, or mercury, below the 35°C (94.5°F) mark [17].
χ. Lubricate the tip of the thermometer with vaseline [17], oil, or neonatal caseous vermix.

5. We suggest delicately holding the neonate in the right lateral decubitus, for right-handers, or contralateral for left-handers, holding him gently by the hip with the non-dominant hand, so that he does not offer resistance and allowing exploration. With the thumb of that hand, separate the gluteus that remains superior, to visualize the neonate's anus where we will insert the thermometer. We do not recommend a supine or prone position as in KT, because in both the baby pushes (Valsalva maneuver), which causes resistance to the insertion of the thermometer.
6. Insert the thermometer with the tip directed towards the neonate's head, with the force of only the 3 fingers and the wrist of the examiner's hand. We insist and suggest using a digital thermometer exclusively for rectal use (Figure 3), or a glass rectal thermometer with Galinstan or oil. We suggest not using glass thermometers with mercury.

Because the number 3 predominates in NT, we also call it the “3-3-3 Technique” which means placing a witness mark 3 cm from the tip of the thermometer, holding it with 3 fingers of the explorer, and maintaining the insertion for 3 minutes. This mnemonic confers greater ease of learning for current and future generations of health personnel who care and will care, for neonates and infants in countries with limited economic resources, with this scientific and current NT, leaving behind the old empirical and insecure KT.

## First variant of the NT

If we do not have a digital thermometer for exclusive rectal use or a mercury-free glass rectal thermometer, and we only have a glass axillary with a rounded tail, we perform the anorectal examination, with the tail, not the tip, with only the first two steps of the NT:
1. We measure 3 cm from the tail towards the body of the thermometer, where we place the witness mark.
2. We hold it with 3 fingers from the mark and introduce it up to the mark and the 3 fingers. Once VAP and detection of ARM have been carried out, we remove it immediately (Figure 2). Later we took the axillary temperature [17].

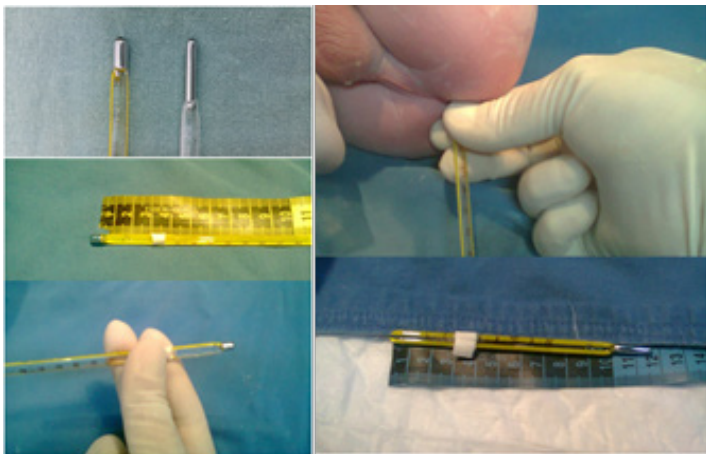

**Figure 2:** Differences in the tip. Place a witness mark on the thermometer and how to hold it. Gentle insertion, maintaining it for 3 minutes, and a variant of the technique.

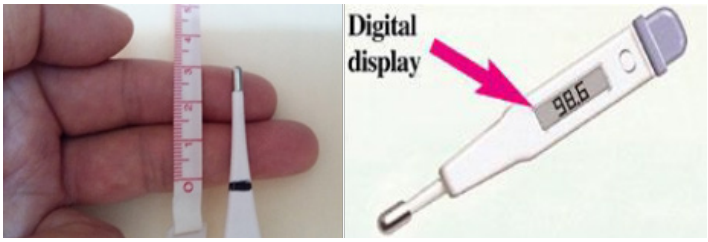


**Figure 3:** Insertion limit witness mark on a digital thermometer.

### Second variant of the NT

If we do not have a thermometer that meets the aforementioned characteristics, we can use what the experts mention, but do not specify, "a probe or rounded instrument" [3]. We suggest and prefer to use a Levin feeding tube, or a Nelaton or Foley urinary catheter, gauges 14 to 16 Fr (4.7 to 5.3 mm) [18], following the same steps as the first variant of this technique. The mnemonic for the two NT variants is “3-3 Technique” because the thermometer is not kept inserted for 3 minutes.

## Discussion

For more than three decades, it has been taken for granted, in Mexico, Latin America, and in developing countries, that a correct anorectal visual examination, with TRT with the KT and with the thermometer that is available, is enough for VAP and detect ARM [1,2,19]. Since then, we have not found a bibliography on this subject, nor has a true and scientifically structured technique been described for this purpose such as the NT [20]. The normal appearance of the anus and perineum can delay said diagnosis, mainly RA, which is the most difficult to detect because it cannot be seen, because the obstruction is deep, from 1.5 to 3 cm inside the anal mucocutaneous junction [1,2,14]. In girls, mainly, ARM with perineal or vaginal fistula go unnoticed for months or years [15], even in boys [19].

Due to reports of serious injuries, some fatal, due to TRT with glass thermometers through the rectum, since the mid-twentieth century, developed countries have eliminated this practice [21,22], but not in developing countries, where it continues to be carried out today, therefore that these accidents may be occurring and, perhaps, are not sufficiently reported, even in developed countries [23,24] due to the lack of a true technique. The reported incidence of rectal perforation by a glass thermometer with mercury is 1 in 2 million, for which many (9.21), and we, consider that it is a safe procedure even if it is carried out empirically, therefore, with trained health personnel, the security is higher [9]. We believe that, with the NT, security would increase exponentially globally.

Given this, we propose the NT, or "3-3-3 Technique", and its two variants “3-3 Technique”, which allows: First, and most importantly, VAP; Second, detect ARM and; Third, record rectal temperature from birth without risk of anorectal lesions. TRT has recently been recommended in preterm infants less than 31 weeks gestational age, inserting the thermometer 1 cm [10]. These three procedures, currently practically empirical, become technical, with greater safety and diagnostic quality, for the patient and for the examiner, acquiring a medical nature. Let us remember that neonatal examination and diagnosis are the sole responsibility of the pediatrician and/or neonatologist, not of the nurse or of doctors in training, much less of nursing and medical students. The cornerstone for the timely diagnosis of ARM continues to be a comprehensive neonatal examination performed by a pediatrician or pediatrician-in-training with sufficient experience [18] and knowledge of this NT.

Experts are of the opinion that NT would only detect 1-2% of ARM with normal anus and rectal atresia because 98-99% of them are evident "with the naked eye" [1,2], but they can go undetected if the exploration is carried out by poorly trained personnel who do not know a technique.

NT has been tested for 18 years in more than 3,000 neonates and 2,000 infants explored with it, and we have transmitted it to more than 650 doctors and nurses, and hundreds of students from both branches, who demonstrated that they were unaware of a technique, in a practical theoretical survey. The results, after the survey, have been satisfactory, so we feel the duty to make it known within and beyond our borders, in order to improve the quality of care from the initial neonatal examination in, VAP, the timely detection of ARM, and TRT.

## Conclusion

With this NT, true, novel, scientific, safe, simple, easy, fast, effective, free of charge and that can be used universally and routinely from the delivery room, it would improve the quality of neonatal care and ensure the correct VAP, the correct and timely detection of 1-2% of ARM, Rectal Atresia, and the correct TRT. Although 98-99% of ARM are obvious to the naked eye, they often go undiagnosed without a detailed technical examination. NT also allow us to diagnose fever with certainty in neonates and infants under 3 years of age.

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To our son Uriel, and to the thousands of newborns and infants in whom we have used and continue to use this technique.

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