**R.M. Torshkhoeva[1,2], L.S. Namazova-Baranova[1,2,3], E.I. Pil'guy[1], A.I. Ermilova[1], A.S. Khazbulatova[1], O.A. Nosacheva[1], L.A. Kvachakhia[1]**

[1] Scientific Center of Children's Health of RAMS, Moscow, Russian Federation
[2] The First Sechenov Moscow State Medical University, Russian Federation
[3] Pirogov Russian National Medical Research University, Moscow, Russian Federation

# Experience of using local anesthetic plaster in pediatrics

**Author affiliation:**

*Torshkhoeva Raisa Magomedovna*, head of the medical rehabilitation department for children with skin diseases at the research institute of preventive pediatrics and medical rehabilitation of the RAMS SCCH

**Address:** 2, Lomonosovskiy Av., Moscow, 119991**, tel.:** +7 (495) 967-14-20**, e-mail:** oszt@nczd.ru

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*Attention to the issue of realizing and appreciating pain by children has been increasing within the last 20 years. Papillomavirus skin infection is a widespread dermatosis in younger children. The only treatment method is mechanical removal, which is accompanied by pain, while cosmetic defect caused by verruciform outgrowths on skin, especially in facial and hand areas, causes psychological problems leading to the child's life quality reduction. The following study assessed efficacy of local analgesic when removing flat warts and papillomata. The obtained results indicate that the use of anesthetic plaster with 5% lidocaine reduces both pain intensity and psychological distress. Plaster therapeutic system is a highly effective analgesic for application anesthesia used to conduct course injections, venous blood sampling and vaccination. This remedy is also recommended for anaesthetization of skin when conducting dermatologic procedures. Convenience and simplicity of use allow using it not only in clinical conditions, but also domiciliary, in particular, by patients themselves.*

***Keywords:*** *papilloma, warts, electrocoagulation, plaster, pain, anesthesia, children.*

Pain is one of the very first psychophysical functions forming in a child. All pain penetration and appreciation routes are formed by 30 weeks of a future child's gestation age [1, 2]. Child's experience of feeling and appreciating pain conditions is connected with intestinal colics, dentition and different medical procedures, such as vaccination, blood sampling, falls, hurts, cuts, dental and wound treatment etc.

Pain reaction is caused by influence of permanent (sex, temperament, age) and temporary factors (environment, situation) [1-4].

Attention to the issue of realizing and appreciating pain by children has been increasing within the last 20 years; the number of publications dedicated to the discussion of this issue has steadily been rising as well. This is caused by medical technological achievements, such as modern surgical interventions and treatment methods, and by new approaches to pain in children.

Widespread painful, psychotraumatic manipulations, such as various types of destructions and electrocoagulations of benign neoplasms, attract special attention when analyzing medical interventions in terms of pain issues. It should be emphasized that a range of complications may develop in case of incorrect and inconsistent removal technique: cosmetic defects (such as ulerythema), wider dissemination of the viral process etc.

Papillomavirus infection (PVI) takes the 3rd place after allergodermathoses and acne in the general structure of dermatologic pathology in children (L. Shachner, N.S. Ling, 1983).

Skin PVI in children has recently become a relevant issue not only of dermatology, but also of pediatrics. The number of such patients is constantly rising, the disease often takes a persistent, recurrent course, while the existing therapy methods often result in the spread of the skin process (E.V. Sokolovskiy, A.V. Ignatovskiy, 2005).

The only therapy method for such patients is mechanical removal, which causes certain difficulties, while cosmetic defect caused by verruciform outgrowths on skin, especially in facial and hand areas, causes social problems leading to child's life quality reduction [5].

Even the slightest painful sensations often significantly hinder conduct of modern dermatological and cosmetological medical procedures. Performing such procedures result in painful sensations of different intensity that are not well-tolerated by small patients. The volume of such interventions is usually insignificant; however, it poses considerable discomfort to a patient, hinders doctor's work, is sometimes seen inadequately by parents and often results in relapsing and progression. Painfulness of the procedure itself often results in a child's pronounced neurotic reactions (S.A. Kirichenko, 2001). Painful sensations caused by one and the same operations in one and the same child may considerably increase due to such negative external factors as serious anxiety, fear of medical staff and procedures, noisy environment and parents' uneasiness. This causes revision and improvement of clinical practice standards in pediatrics. Various committees and centers for studying problems and consequences of pain in children have been founded [1, 3, 6].

Most manipulations in dermatocosmetology require prior anesthesia.

The aim of any surface anesthesia is to prevent development of painful sensations during medical-diagnostic manipulations on body integuments (skin and mucous tunics).

This poses a question of a drug, which not only effectively removes negative sensations caused by a manipulation, but also penetrates tissue with no prior damage to it.

Potential of anesthesia in dermatology and cosmetology has been restricted until recently. The most widespread means of reducing skin pain sensitivity for many decades had been local hypothermia measures. Their disadvantages are: short-term anesthesia, repeated irrigation of the analgesic-affected area, procedure duration increase and formation of "frost" hindering visualization. Moreover, vascular spasm is replaced by vasodilatation with pronounced erythema

and edema of soft tissues after cooling is over. It is especially difficult to employ this technique on facial and head skin.

Despite simplicity and low cost, hypothermal anesthesia is rarely used in dermatological practice.

Another type of local anesthesia employed in dermatology is infiltration anesthesia. This technique also has serious disadvantages: poor penetration of epidermis and derma, discomfort and burning caused by analgesic; need in observing aseptic regulations when preparing for and conducting injection, painfulness of administering needle into tissues, risk of anaphylactoid reactions in sensitized patients. Reiterative (painful) movement of the needle in tissues is necessary to anesthetize a small area of skin [7]. Thus, anesthesia is reached by pain. Expectation of pain only increases its actual sharpness.

The use of injection methods is not always reasonable (big number of removable elements, vast area of the affected surface etc.), while the use of local analgesics in spray form (lidocaine) on skin does not guarantee sufficient level of analgesia. That is why ointments, creams and plasters as local analgesics have long been needed in medical practice.

Pharmacologists had long been trying to create an effective drug for application anesthesia, which would anesthetize when applied on skin surface. A breakthrough was reached in the beginning of 1980s, when an international pharmaceutical company “AstraZeneca” created a drug with unique properties in Sweden. Its active materials are local analgesics lidocaine and prilocaine in equal concentration (2.5% each).

The drug is based on hydrophile-lipophile emulsion, which allows penetrating the skin’s protective barrier effectively and accumulating in epidermis and derma. A specially devised system of conductors allows analgesics – lidocaine and prilocaine – reaching occurrence depth of nerve receptors through undamaged skin [8, 9].

Therapeutic system, or plaster, EMLA (lidocaine + prilocaine) is a unique drug for skin surface anesthesia for injections, punctures, vascular catheterization and surface surgical interventions. Plaster application at least 60 minutes before venous puncture makes this manipulation less painful [10-14].

In pediatrics, children’s dermatologists, anesthesiologists, hematologists and oncologists have gained experience of using this drug, i.e. in areas where children experience numerous painful manipulations (such as puncture, catheterization, blood sampling etc.) [15-20]. Analgesia degree depends on the drug’s dose and duration of application.

Each analgesic should meet a range of requirements:

- remove pain sensitivity of the needed depth and duration throughout application;
- have minimal toxic properties;
- be reversible (it should be possible to restore the blocked function without any damage);

- be well-tolerated.

Introduction of therapeutic system EMLA in medical practice allowed significantly reducing anesthetic risk. Given that all the drug's reactants penetrate skin by means of diffusion and slowly, the risk of anaphylactic reactions is negligibly low, which is why using local analgesic therapeutic system in the form of plaster in children is actual.

As has been mentioned, dermatosurgical procedures requiring anesthesia include laser, radio-wave destruction and electrocoagulation of benign neoplasms (keratomas, flat warts, papillomata, milia).

It is reasonable to employ surface (application) anesthesia for this manipulation. Advantages of the topical analgesic are: application painlessness, high analgesia level; patients may use the analgesic themselves (after consulting a doctor) before a procedure. Certified topical analgesics in the Russian market at present are cream and plaster EMLA. It is important to observe standard recommendations to ensure maximal anesthetic effect, as the therapeutic system's analgesic effect depends on dose and exposure time.

Drug's usability allows patients to conduct anesthetic preparation before procedures themselves strictly observing doctor's recommendations; first, this reduces doctor visit's duration, second, it gives additional psychological comfort: by sticking the preparation themselves, patients are absolutely sure about the area of anesthetized surface.

Naturally, if such painful manipulations are conducted using anesthesia from birth, a child will not fear another visit to a doctor, encounter with a nurse etc. [21-23].

The first step to adequate pain management is its evaluation. Pain evaluation tools should be practical (convenient), reliable, substantiated and suitable for children of different development levels. As pain is subjective, self-appraisal is considered to be a standard criterion. Usually, children are able to differentiate high/low pain intensity level from the age of 3.

Selection of means of assessing pain degree, apart from pain type, depends on child's age and development, clinical circumstances and cultural background. Subjective character of pain makes it difficult to measure.

Different clinics use 3 evaluation aspects to appraise presence, degree and localization of pain at present: self-appraisal of pain intensity, motor reaction and physiological reaction. Most of them are based on subjective appraisal of sensation by patients.

That is why we studied analgesic effect of the therapeutic system in form of plaster for surface anesthesia.

182 patients (107 girls and 75 boys) of 6-8 years of age were under observation. Diagnosis "flat warts" with localization on face and hands (3-4 elements per patient at the average) was set for 95 patients; papillomata localized on back of hands and fingers (4-7 elements at the average) were diagnosed in 87 children. 103 patients (study group 1) were revealed with primary disease

manifestations, 79 – with relapses (group 2). It should be noted that the group 2 patients had once received this procedure with other anesthesia types. The average diameter of neoplasms was within 5mm.

At our center, we removed papillomata with an electrocoagulator. A dermatologist would examine a neoplasm and anesthetize skin around it before removal. We employed application anesthesia using the aforementioned plaster.

Elements were anesthetized and removed in the presence of parents and with their consent. Plaster application technique was the same in all cases. Plasters were stuck on areas to be anesthetized. Application duration was at least 60 minutes, then the plaster was removed. It is painless to remove the plaster, as it has already anesthetized the surface. Analgesic effect's duration after the plaster is removed is up to 4-5 hours (in case of application for 1-2 hours).

We used a visual analog scale to register pain in children and a McGill Pain Questionnaire to assess subjective pain experience.

Most (69.9%) group 1 children assessed pain intensity as mild during electrocoagulation; 11 (10.7%) patients did not feel any pain at all; at the same time, 67% of group 2 patients assessed pain intensity higher (average); differences reached the statistical significance level (tb. 1). It should also be noted that some group 2 patients (17.7%) thought that electrocoagulation is accompanied by severe/intolerable pain.

**Table 1**. Intensity of pain manifestations (visual analog scale)

| Pain intensity | Group 1 (primary manifestations), n=103 (100%) | Group 2 (with relapses), n=79 (100%) |
|---|---|---|
| No pain | 11 (10.7%)* | 2 (2.5%) |
| Mild pain | 72 (69.9%)* | 10 (12.8%) |
| Average pain | 20 (19.4%) | 53 (67%)* |
| Severe pain | 0 | 14 (17.7%)* |

*Note. * - $p \leq 0.01$ between groups I and II.*

Children who received electrocoagulation using a plaster easily established a contact with both nurse and doctor; this reduced pain threshold in comparison with children who had already experienced this procedure with other types of anesthesia.

McGill Pain Questionnaire's data were more representative (tb. 2). Group 2 patients tended to choose a bigger number of pain descriptive characteristics and stronger intensity registers. Group 1 patients chose strong pain intensity registers significantly rarer ($p<0.05$), especially on the questionnaire's evaluative scale. Group 2 patients chose all the given pain descriptive

characteristics more often; this statistically significantly ($p<0.01$) distinguished them from other patients.

**Table 2**. McGill Pain Questionnaire's data

| Questionnaire scale | Group 1, n=103 | Group 2, n-79 |
|---|---|---|
| Sensory NWC | 2.93±1.03 | 4.48±2.90 |
| Affective NWC | 2.5±1.01 | 4.0±1.9 |
| Sensory PRI | 2.93±1.03 | 12.07±2.40* |
| Affective PRI | 5.0±2.3 | 7.93±2.51 |
| Evaluative PRI | 1.86±0.30 | 3.67±1.60* |
| Total NWC | 5.86±3.10 | 16.55±6.10* |
| Total PRI | 7.5±2.60 | 11.93±4.30 |

*Note. NWC – number of words chosen; PRI – pain rating index; * - p≤0.01 between groups I and II.*

Thus, pain intensity in all patients depends on intensity of psychological distress, especially in group 2 children with disease relapses.

We may conclude that use of plasters has good analgesic effect, favors the feeling of comfort, safety and relaxation in patients and convenience for doctors conducting procedure. Another advantage of plasters is their availability. They may be domiciliary applied by patients themselves before a procedure; this significantly reduces doctor visit's duration.

This preparation is the preferred analgesic means for modern dermatological and cosmetological procedures used to prevent pain, its consequences and formation of negative attitude to any future medical manipulations in children.

Side effects were noted in 3 patients. They manifested themselves by temporary local skin reaction – its moderate reddening; these symptoms disappeared within 1-2 hours after the analgesic was removed.

**CONCLUSION**

Surface anesthesia system in the form of plaster ensures good analgesic effect and is well tolerated by patients. Unfavorable effects are extremely rare, are moderately manifested and, as a rule, disappear within 1-2 hours after the analgesic is removed.

An important condition of adequate anesthesia is correct technique and observation of the recommended exposure time.

Creation of a fundamentally new local analgesic preparation (therapeutic system in the form of plaster) allowed solving many issues of local anesthesia in pediatrics and in dermatocosmetology in particular. Therapeutic system in the form of plaster is a highly effective analgesic for

application anesthesia used for course injections, venous blood sampling and vaccination. It has high absorption level. This preparation is also recommended for anesthetizing skin during dermatological procedures. Convenience and usability allow using it not only in clinical conditions, but also domiciliary, but patients themselves in particular (on doctor's prescription). Plasters may be purchased in pharmacies over the counter.

Thus, EMLA is a local analgesic plaster dedicated to change conception of doctor visit in small patients.

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