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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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DOES AN EARLY POST-OPERATIVE PAIN RELIEVE INFLUENCE THE FUNCTIONAL OUTCOME OF PATIENTS WITH COLLES FRACTURES TREATED WITH EG-BLOCK SYSTEM?

Giuseppe Taccardo[1]*, Andrea Perna[1]*, Alessandro Domenico Santagada[1], Marco Passiatore[2], Calogero Velluto[1], Luca Proietti[1], Santi Muscolino[3], Rocco De Vitis[1], Marco D'Orio[1].

[1]Department of Orthopaedics, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy.
[2]Bone and Joint Surgery Department, ASST – Spedali Civili, Brescia, Italy.
[3]University of Palermo, Palermo, Italy.

Abstract.

Background: Distal Radius Fractures (DRFs) represent one of the most common elderly patient's fractures. Often DRFs required surgical treatment based on instability of the fragments and due to the high functional demand from patients. A general agreement on the best pharmacological treatment in the post-operative is still missing. The present study describes the clinical outcome in patients who underwent surgery for Colles fracture using ES fixation osteosynthesis.

Methods: The present investigation represents a one center retrospective analysis. In this study, two different medical treatments were recognized, and groups consequently set (Group A: Ketoprofene 100 mg twice a day for 5 days, 59 patients; Group B: Tramadol 75 mg and Dexketoprofen 25 mg, 62 patients). Outcomes were the functionality of the affected wrist through AROM assessment and the evaluation of painkillers intake, pain itself and Quick-DASH.

Results: 121 patients were included in the present study. The pharma blending of Tramadol 75 mg and Dexketoprofen 25 mg resulted effective for the rapid recovery of the treated wrist motion. In fact, in the group B motion was better compared to group A ($p<0.05$) for any movement examined (flexion, extension, pronation, supination) until the last follow-up (70 days).

Conclusions: Associations of different painkillers are common, even if a general agreement on the most effective combination is still missing. Tramadol and Dexketoprofen provide a good clinical result, less side effects and a better functional recovery of the wrist motion. This guarantees a fewer social cost and a best management of post-operative physiotherapy.

Key words. Wrist fracture, Colles fracture, CRIF, Postoperative pain, pain killers.

Introduction.

Distal Radius Fracture is one of the most common injuries of the upper limb and they occur at all ages [1]. Extra-articular distal radius fractures (EDRF), known as Colles fractures, are one of the most common elderly patients fractures and the incidence is expected to increase with the aging of population, resulting in a non-negligible cost to society [2]. Functional impairment frequently occurs after EDRFs, due to inappropriate treatment [2,3].

Multiple choices for treatment remain possible [3]. Closed reduction and cast immobilization is an option, nevertheless loss of reduction can occur [3]. Furthermore, immobilization represents an obstacle to early movement recovery [2-4]. Surgical treatments include open reduction and internal fixation (plate and screw), which allows early mobilization, but it is considered by some authors as excessive, [3,5,6] exposing patients to avoidable complications due to internal fixation [7-9].

Closed reduction and percutaneous fixation represents even today a valid surgical procedure for EDRFs [3]. The Epibloc System (ES) is a percutaneous intramedullary fixation device used for this kind of fractures [5,6,10-12]. ES is reliable, simple, mini-invasive, cost-effective, easily removable and guarantees a stable fixation, allowing very early and safe active post-operative movement [5,10,11].

Most of patients experience significant post-operative pain, that does not allows early active movements and impairs functional results [2]. Pain killers could play an important role in the postoperative management; thus, pain reduction encourages active movement of the treated hand and wrist [13].

Many drugs could be used, but the choice of the best pain killer therapy is frequently related to surgeons' and physicians' personal beliefs [13-17]. In general, an active substance alone is commonly believed to be enough for pain control after a percutaneous surgical treatment. Acetaminophen and nonsteroidal anti-inflammatory drugs (NSAID) are believed to be adequate to treat osteoarticular pain [14]. However, when the maximum dose is reached, evident beneficial effects are not obtained, and side effects occur [14]. Analgesic combinations should be useful to obtain a longer and a more effective pain control, limiting the pain killer use and improving functional results [13-17]. Only a few studies in the literature specifically evaluate pain management protocols during post-operative period after wrist surgery [13,18].

The purpose of the present retrospective study was to investigate if the combined use of NSAIDs and opioid analgesic can improve clinical recovery, compared to the use of NSAIDs alone, in a cohort of patients who underwent wrist surgery with ES.

Materials and methods.

Study design and aim: The present investigation consists in a retrospective analysis on patients with EDRF referred at our Emergency Department and treated with percutaneous ES fixation from January 2015 to April 2019. The aim of the study is to evaluate if the use of an appropriate pain killer in the immediate post-operative period can facilitate early mobilization of the treated wrist and therefore improves functional outcomes. All patients signed a written consent concerning demographical

and clinical data collection for scientific purposes according to institutional protocol. The study respects national ethical standards and the Helsinki Convention. Moreover, considering that the two therapies being studied are already used in the post-operative painkiller protocols in our institute, a formal ethical approval was not requested for this retrospective study.

Institutional Database and data collection: At our Emergency Department, patients triaged for wrist fracture are managed using a standardized data collection system. From these patients, we collected demographic, clinical and radiographic data (age, sex, BMI, anamnestic record, medical history, chronic therapies, smoke addiction, history of osteoporosis).

Inclusion and exclusion criteria: All patients with EDRF fracture (type 23-A2 and 23-A3 according to AO classification) [19] treated with closed reduction internal fixation (CRIF) through Epibloc system fixation were potentially eligible for the study. From the study were excluded: pregnant or breastfeeding woman; patient with: Alzheimer or Parkinson disease; patients with or with a history of gastric ulcer; patient with moderate to severe renal dysfunction (creatinine clearance < 60 ml/min), hepatopathy (MELD Score > 9), previous wrist or hand fractures and also patients with diagnosis of depression or rheumatic diseases (e.g., rheumatoid arthritis), patients younger than 18 years, allergy, or contraindication to the study drugs. Patients who underwent surgery more than 7 days post trauma were excluded from this retrospective analysis. Patients who have not been compliant to the post-operative therapy and assessments were also excluded. Patients who reported a complex regional pain syndrome (CPRS) were excluded.

Patients assignment and groups setting: The patients were divided as follows based on the further pharmacological treatment received:

- Group A: Ketoprofen 100 mg twice a day for 5 days, from the first day after surgery. This group included 59 patients (48,8%, 38 F, 21 M)
- Group B: Tramadol 75 mg and Dexketoprofen 25 mg (in a single tab) twice a day for 5 days, from the first day after surgery. This group included 62 patients (51.2%, 44 F, 18 M).

Acetaminophen 1000 mg could be administered at most three times a day during all the post-operative period as a second-line analgesia (rescue drug).

A summary of demographic characteristic and comorbidity was reported in Table 1.

All patients received gastro-protective prophylaxis with Omeprazole 20 mg for 15 days.

Table 1. Demographics.

Demographics	**Group A**	**Group B**
Number of patients	59	62
Gender	38 F, 21 M	44 F, 18 M
Age (years) (mean ± SD)	76.1 ± 9.2	77.2 ± 8.3
BMI (mean ± SD)	27.4 ± 2.7	28.1 ± 3.9
Dominant side	30 (50.8%)	25 (40.3%)
Smokers	10 (16.9%)	9 (14.5%)
History of confirmed osteoporosis	32 (54.2%)	29 (46.8%)

SD: standard deviation. BMI: body mass index.

The use of further painkillers was not restricted. In case of need they should call to the referring physician before taking any drugs. In this way the improper use of drugs was controlled, and the physicians could keep track of the drugs (painkillers) used by each patient. Each patient was required to keep track of all the drugs taken.

Post-operative assessment:

The complete post operative data setting for patients who undergo surgery (ES osteosynthesis) for distal radius fracture includes:

- 6 days post-operative clinical evaluation and plain radiographs (anterior-posterior view, lateral view of forearm), to exclude any further significant displacement. The compliance to the therapy was assessed. Clinical assessment performed: Active Range of Movement (AROM), pain, drug daily intake. Pain was assessed through visual analogue scale (VAS). Each patient has been verbally instructed on the home physiotherapy to be performed.
- 30 days post-operative clinical evaluation and plain radiographs (anterior-posterior view, lateral view of forearm), to confirm healing. Clinical assessment performed: AROM, pain, drug daily intake.
- Clinical evaluation after the removal of the wires (45 days after fracture). Active Range of Motion (AROM) of wrist and forearm is recorded, and specific hand and wrist physiotherapy was prescribed if patients reported 80% or less of AROM compared to the opposite side. Clinical assessment performed: AROM, pain, drug daily intake.
- 70 days post fracture clinical evaluation after the removal of the wires. AROM of wrist and forearm is recorded again. Clinical assessment performed: AROM, pain, drug daily intake, Quick DASH questionnaire outcome. The Quick DASH score represents a shortened version of the DASH Outcome Measure (composed by 30 items). The Quick DASH composed by 11 items is a rapid tool to measure physical function and symptoms in people with musculoskeletal disorders of the upper limb.
- Further assessment is considered on a case-by-case basis.

Data about the painkiller drugs intake were clustered a priori in two major period: before the removal of the wires (7–45 days post-surgery) and after the removal (45–70 days post-surgery).

Surgical technique:

All patients were surgically treated by two expert hand surgeons (G.T. and R.D.V.) [20]. All procedures were performed in plexus anesthesia and transient ischemia with pneumatic cuff. With radiographic guidance using a standard C-Arm device, two retrograde wires were introduced percutaneously by the distal radius epiphysis, after appropriate fracture reduction maneuvers.

The osteosynthesis was completed by locking two wires together with an external radiolucent plate (EG-Block System, Bone S.r.l. Italy, RM). With this system wires can be implanted into the radius medullary canal and advanced without breaking through the second cortex; the external plate guarantees dynamicity to the implant through the elasticity of the wires, which compress the fractured surfaces.

After the surgery, no cast was applied. All patients were treated on average 5.6 (±1.4) days after the fracture trauma. The wires were removed after the fracture healed.

Outcomes:

The primary outcome was the functionality of the affected wrist through AROM assessment. Secondary outcomes were the assessment of painkillers intake, pain itself (through Visual Analogue Scale, VAS) and Quick-DASH. Side effects were registered too.

Statistical analysis:

Data are presented as mean and standard deviation. The Shapiro-Wilk test was used to check for normal distribution. Data were analyzed with Mann Whiteny U (for non-parametric values) and Student's t-test (for parametric values) to compare continue variables. Statistical analysis was performed using the Chi-square test for categorical variables. The significance was established for a value of $p < 0.05$. Dedicated software (SPSS v.20.0 software - SPSS Inc.; Chicago, IL) was employed. Only one decimal digit was reported, rounded up.

Results.

Population: A drop-out occurred in both groups. In group A (Ketoprofen alone),5 patients discontinued the administration of drug because of side effects (1 case of headache, 4 cases of gastritis), 2 cases of CPRS occurred, 4 patients were lost at follow up. In group B (Tramadol + Dexketoprofen), 6 patients discontinued the administration of drug because of side effects (2 cases of gastritis, 4 cases of headache), 1 patient was lost at follow up, 2 cases of CPRS occurred. Finally, 48patients (47.5%, 30 F, 18 M) were included in group A and 53 (52.5%, 36, 17 M) in group B.

Comparing the drop-out rate, the difference between group A and B was not statistically significant (p=0.541).

Healing occurred in all patients within 45 days after fracture. Wires removal was performed 36±3.9 days after surgery. No major complications were observed.

AROM outcome:

In group A motion was better compared to group B ($p<0.05$) for any movement examined (flexion, extension, pronation, supination) until the last follow-up (70 days) (Table 2). During the 45 days evaluation of the AROM, in the group A 63.8% of patients need a specific hand and wrist physiotherapy prescription, while in the group B only 38.7% of patients, and this difference was statistically significant (p=0.0032).

Painkiller intake assessment: No statistical difference was reported in painkillers intake comparing group A and B before and after 45 days post-surgery ($p>0.05$) (Table 3). Forty-five days after surgery all patients had already undergone wire removal. Pain was significantly lower in group A before the wire removal ($p<0.001$).

No statistical differences were found in pain comparing the two groups after 45- and 70-days post-surgery ($p>0.05$) (Table 3).

Pain and functional assessment: After 70 days no statistical differences were revealed comparing group A and B ($p>0.05$), and all patient recovered a good function (Table 4).

Discussion.

Functional impairment frequently results from wrist and hand fractures, due to incorrect reduction of fracture and joint stiffness [2,3,21]. The two are not mutually exclusive. Hence very early hand and wrist motion should be encouraged.

Our study demonstrate how important is to choose from the earliest post-operative days the right painkiller therapy, to obtain a good clinical result as soon as possible.

Inflammation is an essential part of the early stage of bone fracture healing [22]. Mechanical damage to the bone cell membranes releases arachidonic acid, which is converted by cyclooxygenase-2 (COX-2) into pain-mediating pro-inflammatory prostaglandins [23]. Fracture hematoma, occurring immediately after injury due to broken vessels, is characterized by hypoxia and low pH and contains pro-inflammatory cytokines and cells [22]. COX-2 levels are increased in fracture

Table 2. Active Rang of Motion (AROM) outcome. All values are reported as a percentage to the contralateral side ± standard deviation (SD).

AROM	Post operative time	Group A	Group B	Inter-group comparison (p value)
Flexion	**6 days**	27.1±7.4	48.9±7.4	P<0.001
	30 days	61.6±10.6	68.9±8.3	P<0.001
	45 days	62.3±10.6	78.9±7.4	P<0.001
	70 days	85.5±7.4	88.6±6.8	P=0.040
Extension	**6 days**	24.5±6.6	39.4±8.1	P<0.001
	30 days	34.8±7.1	46.6±7.6	P<0.001
	45 days	45.0±7.3	53.5±7.8	P<0.001
	70 days	75.2±7.2	82.3±9.1	P<0.001
Pronation	**6 days**	22.8±7.6	35.5±6.6	P<0.001
	30 days	60.2±8.4	80.0±11.0	P<0.001
	45 days	58.4±8.4	71.3±7.4	P<0.001
	70 days	87.2±7.4	90.8±6.4	P=0.038
Supination	**6 days**	22.9±7.5	39.4±8.6	P<0.001
	30 days	54.3±7.1	68.3±7.6	P<0.001
	45 days	54.2±6.8	70.4±7.3	P<0.001
	70 days	86.5±8.1	90.1±6.6	P=0.008

*Table 3. Drug daily intake assessment. *Second drug was Ketoprofene (100 mg) in group A and Tramadol (75 mg) and Dexketoprofen(25 mg) in group B. All values are reported as mean ± standard deviation (SD).*

Post operative time	Drug	Mean daily intake - Group A	Mean daily intake - Group B	Inter-group comparison (p value)
7 – 45 days	**Acetaminophen**	2.0±0.5	2.0±0.5	P=0.995
	Second drug*	0.3±0.4	0.2±0.4	P=0.714
	Other	0.2±0.4	0.2±0.4	P=0.717
45 days after surgery	**Acetaminophen**	1.2±0.4	1.2±0.4	P=0.718
	Second drug*	0.2±0.4	0.2±0.4	P=0.720
	Other	0.1±0.3	0.1±0.2	P=0.673

Table 4. Pain assessment through visual analogue scale (VAS) and functional assessment through DASH questionnaire. All values are reported as mean ± standard deviation (SD).

Pain	Post operative time	Group A	Group B	Inter-group comparison (p value)
VAS	**6 days**	7.2±1.0	5.3±1.1	P<0.001
	30 days	4.9±0.9	3.9±0.7	P<0.001
	45 days	3.2±1.1	3.1±1.3	P=0.576
	70 days	1.3±0.7	1.2±0.7	P=0.230
Quick DASH	**70 days**	21.4±9.3	19.3±7.9	P=0.199

hematomas and, besides having pro-inflammatory activity, are also able to promote angiogenesis and the differentiation of mesenchymal cells into osteoblasts [24]. Accordingly, to use NSAIDs are not clearly discouraged to treat pain derived from a fracture, however caution is recommended [25,26].

To investigate pharmacological blend for treatment of this kind of pain should not be overlooked, in order to reduce the intake of NSAIDs [13,18]. Nevertheless, not much literature has been produced about the use of pharmacological blend in wrist fractures [13].

Several studies have shown that the combination of two or more analgesics allow the increase in efficacy and reduce the doses of the individual drugs, consequently the side effects [27,28]. In our series non statistical difference were reported concerning therapy compliance or discontinuation related to side effects. Heartburn, gastritis, and headache seems to be the most common side effects.

The combination of Tramadol and Dexketoprofen has been on the market for many years [16,29]. Tramadol analgesic efficacy is due to the long-lasting effect (t1/2 of about 6 hours). Furthermore, it is safer compared with other opioids. Indeed, Tramadol has not relevant effects on cardiovascular and pulmonary parameters, on the gastrointestinal transit, and has low addiction rate [29].

In our study we observed significantly higher AROM values in pronation and supination after 4 weeks in the group treated with dexketoprophen + tramadol (group B), accordingly with the better function measured through Quick-DASH and the lower need to perform physiotherapy (63.8% *vs.* 38.7%).

This is a successful goal, considering that the cost for physiotherapy per patient in Group B has been reduced by almost a half.

These results underline how important is to improve movement. Patients of Group B have less pain until the third check, then the pain control data become the same as in group A (Table 4). Obviously, pain decreases after removing the wires in both groups.

The continuous need of additional painkillers after the first 6 days should not be overlooked [2]. Further studies are needed to investigate longer protocols for pain therapy in wrist fractures.

Moreover, patients clearly preferred to use acetaminophen to other drugs (table 3). This underlines how the use of acetaminophen is ingrained in popular culture as a first line painkiller [28]. In the same way the irrational fear for opiate drugs and NSAIDs can explain the choices of many of our patients. The suggestion of acetaminophen as preferred rescue drug could represent a bias in this study. This aspect could be further investigated in other studies.

Even if painkillers play a role in early functional recovery, the final recovery seems not to be affected by pain, in fact no difference were revealed between the two groups in term of function and movement at the last follow-up. This confirm that a proper surgical intervention and a proper physiotherapy are needed to obtain a good global result [2,3,19].

Limitations.

This study has a retrospective design and patients are not randomly assigned to each group. Thus, the sample could not reflect the real population. The follow up is short, however, the focus of the study was on short-term outcomes. Studies with longer follow ups are not discouraged.

We decide to exclude a priori patients suffering from post-operative CRPS, because they need for a more specific and longer pain therapy [30,31]. Nevertheless, in the future it could be interesting to investigate the role of dexketoprofene and tramadol in this kind of patients.

Moreover, a longer follow up can include further post operative late complications, such as synovitis and carpal tunnel syndrome and the following pain management [17,32].

Conclusion.

Sustained pain relief promotes the rapid restoration of motor function avoiding complications and further costs for the health of these patients. The combined use of dexketoprofene and

tramadol is encouraged to allow a better outcome both in terms of social costs and early recovery of wrist function.

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