Arthroskopie

AGA-Komitee-Hefte

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Writing an abstract

Elmar Herbst[1] · Sebastian Kopf[2] · the AGA Research Committee

[1] Department of Trauma, Hand and Reconstructive Surgery, University Hospital Muenster, University of Muenster, Muenster, Germany

[2] Center of Orthopaedics and Traumatology, University Hospital Brandenburg an der Havel, Medical School Brandenburg, Brandenburg an der Havel, Germany

Abstract

Abstracts are the most important part of a manuscript as they are the most widely read. In general, unstructured abstracts must be differentiated from structured abstracts. While the latter follow a clear and obvious structure (e.g., background, aim, methods, results, conclusion), unstructured abstracts are basically written the same way but without this obvious structure. Abstracts are generally written in past tense and the third person, and must follow the instructions provided by each journal or conference. Importantly, the key message of the abstract should align to the main manuscript and should not contain any other or irrelevant information. In this manuscript, for each section of an abstract, tips and tricks are provided for preparing an abstract.

Keywords
Research · Methods · Publications · Science · Congress · Abstract

Introduction

The abstract or summary is arguably the most important part of a scientific paper as it is the most widely read part of the manuscript. The abstract should not only provide the most accurate description of a study, but also serve as a promotional tool [5, 7, 10, 11]. Often, readers decide whether to continue to read the full manuscript or listen to a scientific presentation at a conference based solely on the abstract. For authors of abstracts, this means that the aim, methodology, results, and conclusion of a study must be presented as clearly and precisely as possible. This is the only way to arouse the reader's interest and encourage them to continue to read. However, if many questions about the study remain unanswered after reading the abstract, it is unlikely that the full manuscript will be read, despite the potentially excellent scientific work.

In general, abstracts follow the structure as asked by scientific journals or conferences. Therefore, this article aims to provide a general overview on how to write an abstract.

Types of abstracts

There are two main types of abstracts. On the one hand, there are descriptive abstracts, which are typically about 100 words and describe nothing more than the aim and methods of a study. The reader is encouraged to read the full manuscript to fully understand the main findings of the scientific work. In contrast, informative abstracts, such as those commonly found in the field of orthopedics and trauma surgery, succinctly summarize the content of the manuscript in about 350 words. Therefore, informative abstracts include at least the aim and methodology of the work, the results, and the conclusions. This means that an informative abstract must be written in such a way that the reader will have understood the main aspects of the scientific work after reading the abstract (Example 1 below). Abstracts submitted for conferences may be slightly longer and may

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include figures and/or tables, depending on the guidelines. Thus, abstracts for conferences can and should place even more emphasis on the presentation of results.

Example 1: fictional structured informative abstract

Aim/hypothesis: The aim was to investigate pain and symptoms following medial opening wedge high tibial osteotomy (HTO) compared to conservative management. It was hypothesized that the Knee Injury and Osteoarthritis Outcome (KOOS) score for pain and symptoms would be significantly higher after HTO than after conservative management.

Methods: In this prospective randomized study, 100 patients with medial knee osteoarthritis and varus deformity >5° were included after appropriate sample size calculation. Fifty patients each were assigned to either conservative therapy (group A) or medial open wedge HTO (group B). Conservative treatment consisted of wearing a valgus-producing knee brace, strength training, and physical therapy. KOOS pain and symptom subscores were collected at 6 weeks and 6, 12, and 24 months. Clinically significant improvement was defined as an increase of 20 points in the primary endpoint, KOOS pain. The two groups were compared using two-tailed t-tests and a significance level of $p < 0.05$ after confirmation of normal data distribution.

Results: Demographic data were comparable between the two groups (mean age: group A 54 ± 4; group B 56 ± 3 years; $p > 0.05$). KOOS pain and KOOS symptoms were statistically but not clinically significantly better in group A than in group B at 6 weeks (72 ± 4 vs. 64 ± 9 and 67 ± 3 vs. 61 ± 4; $p < 0.05$). From the sixth month, patients after HTO showed statistically but not clinically significantly better values (64 ± 3 vs. 61 ± 5 and 77 ± 6 vs. 65 ± 4; $p < 0.05$). At 12 and 24 months, the KOOS subscores in the HTO group were not only statistically but also clinically significantly better in group B than in group A ($p < 0.05$). Looking at the course of conservative therapy over time, there was a statistically significant improvement in both KOOS subscores during the first 6 months ($p < 0.05$), whereas between 6 months and 24 months there was a worsening of symptoms to preintervention levels. In contrast, in group B, both KOOS subscores were statistically and clinically significantly higher than preoperatively at 2 years (54 ± 8 vs. 84 ± 6 and 49 + 5 vs. 79 ± 10; $p < 0.01$).

(Optional in conference abstracts: table/figure [no repetition of text content!])

Conclusion: The results confirm the hypothesis that HTO in patients with medial knee osteoarthritis is statistically superior to conservative therapy in terms of pain and symptoms from 6 months postoperatively and clinically superior from 12 months postoperatively. Short-term symptom bridging with conservative therapy cannot be recommended based on these data, as no clinically significant symptom improvement was observed. In conclusion, the medial open wedge HTO should be considered the treatment of choice for symptomatic medial knee osteoarthritis.

Keywords: osteoarthritis, medial opening wedge high tibial osteotomy, HTO, physical therapy, KOOS

Abstracts can be structured or unstructured. Structured abstracts follow a clear structure (e.g., aim of the work, methods, results, and conclusion; Example 1) [9]. Unstructured abstracts, on the other hand, present a continuous text without a predefined structure, although the content of unstructured abstracts also consists of an introduction, main body, and conclusion (Example 2).

Example 2: Unstructured abstract as from [2]

Meniscectomy is one of the most popular orthopedic procedures, but long-term results are not entirely satisfactory and the concept of meniscal preservation has therefore progressed over the years. However, the meniscectomy rate remains too high even though robust scientific publications indicate the value of meniscal repair or non-removal in traumatic tears and nonoperative treatment rather than meniscectomy in degenerative meniscal lesions. In traumatic tears, the first-line choice is repair or non-removal. Longitudinal vertical tears are a proper indication for repair, especially in the red–white or red–red zones. Success rates are high and cartilage preservation has been proven. Non-removal can be discussed for stable asymptomatic lateral meniscal tears in conjunction with anterior cruciate ligament (ACL) reconstruction. Extended indications are now recommended for some specific conditions: horizontal cleavage tears in young athletes, hidden posterior capsulomeniscal tears in ACLinjuries, radial tears, and root tears. Degenerative meniscal lesions are very common findings which can be considered as an early stage of osteoarthritis in middle-aged patients. Recent randomized studies found that arthroscopic partial meniscectomy (APM) has no superiority over nonoperative treatment. Thus, nonoperative treatment should be the first-line choice and APM should be considered in case of failure: 3 months has been accepted as a threshold in the ESSKA Meniscus Consensus Project presented in 2016. Earlier indications may be proposed in cases with considerable mechanical symptoms. The main message remains: save the meniscus!

Unstructured abstracts are often found in conjunction with review articles. However, some journals also require unstructured abstracts for original articles. Although there is no obvious structure, the content of unstructured abstracts follows that of original articles including an introduction, description of the methods and results, and concluding remarks [6].

Structure of an abstract

Essentially, the structure of an abstract follows the guidelines of the various journals. The following sections discuss the most common components.

Background

The background of an abstract usually consists of one or two sentences that present the (clinical) problem. A common mistake is to discuss what is already known about the topic instead of highlighting the unanswered questions. The reader should immediately understand the gap in knowl-

edge that the study aims to fill. An example of a good background section could be [1, 3, 4]:

Transtibial drilling of the femoral bone socket in anterior cruciate ligament reconstruction is commonly performed as it is easy and fast. However, this technique poses the risk of nonanatomic bone tunnel placement.

In this example, it is clear, what is known about the subject (easy and fast drilling method) and why the study is needed (nonanatomic tunnel placement).

Aim of the scientific study

The aim of the study must be clearly stated in every abstract. The statement should provide a concise explanation of what the study specifically aims to investigate. It is important to be as precise and specific as possible. In abstracts, the background and aim of the work are often presented in a single paragraph [6].

Materials and methods

This section should help the reader to understand how the study was carried out. Therefore, the methods section of an abstract briefly and concisely describes the study design, the type and size of the study population, the study endpoints, and a sentence about the statistical methods. However, depending on the length of the abstract, the description of statistical procedures may be omitted unless they are relevant for the interpretation of the results (e.g., post-hoc corrections for multiple testing, multiple regression, etc.) [6].

An example of appropriate methodology is presented in Example 1, and an example of inappropriate presentation of the methods section based on the same fictional abstract might be:

In this study 100 patients with knee osteoarthritis were included and treated either conservatively ($n = 50$) or operatively with a medial open wedge high tibial osteotomy (HTO; $n = 50$). After 6 weeks and 6, 12, and 24 months, patient-reported outcome scores were evaluated. Additionally, patient satisfaction and pain were documented and statistically analyzed ($p < 0.05$).

In this example, neither the study design nor the inclusion and exclusion criteria are defined. Furthermore, it is not clear what the authors mean by "conservative treatment." The endpoints of the study are not defined.

Common mistakes in presenting the methodology include describing unimportant details that only confuse the reader in such a short text. Instead, even after reviewing the methodology in the abstract, it should be clear in general terms how the study was conducted [1, 4].

Results

Apart from a clear research question, the results are the most important part of an abstract as they are the reader's main interest. Therefore, the results should be presented in as clear and detailed a manner as possible. The data presented in the abstract must be consistent with both the results in the main manuscript and with the conclusion. It is therefore surprising that this is not the case in almost 80% of manuscripts, and sometimes divergent results are presented in abstracts [8].

The results section includes not only qualitative but also quantitative results, including means/medians and standard deviations or *p*-values [1]. Degrees of freedom of statistical tests are not reported here.

As mentioned earlier, results should also be described qualitatively. This means that not only a group difference is reported, but also which group achieved higher values. The author of an abstract should focus on the most important results according to the hypothesis and endpoints, in accordance with the specified abstract length. Secondary analyses are less important [6].

Results checklist

- *The data presented must be consistent with the results reported in the main manuscript.*
- *Absolute and relative data are required, including standard deviations, confidence intervals, etc.*
- *Results should be presented with p-values, unless the study is purely descriptive.*
- *Results should not be interpreted or provided with reinforcing/qualifying adjectives (e.g., extremely, significantly …)*

Conclusion

The conclusion contains the most important statement of a manuscript and usually consists of one or two sentences summarizing the main findings of the paper by addressing the hypothesis. In addition, the main results of the study should be placed in a clinically relevant context and discussed. It should be discussed how the results of the study have implications for clinical practice. As the reader often skips straight to this section of the abstract, it is the responsibility of the authors to describe the results of the study and their implications in a concise and precise manner [1].

In some journals, the clinical relevance of the data in the abstract is listed separately from the conclusion.

General guidelines for writing an abstract

An abstract condenses and communicates the key points of a scientific paper in up to 350–400 words. A common mistake in writing abstracts is to include information that will not be discussed in the main manuscript. As the author of an abstract must adhere to a very limited length, it is difficult and important at the same time to focus on the key messages of the paper. This means that the author must ensure that the information provided in the abstract is consistent with the content and message of the main manuscript. Therefore, it is advisable to write the abstract at the end of the manuscript writing process, in order to follow the thematic thread of the main manuscript. Many authors find it easier to write an abstract first, regardless of the word limit, and then adjust the abstract length according to the journal's requirements.

It is important when writing an abstract, especially in structured abstracts, that each part can stand on its own, so that the reader does not have to invent connections or conclusions. The abstract should be written in the past tense and in the third person. If abbreviations are used, they must be described the first time

they are used, e.g., "anterior cruciate ligament (ACL)." Unlike the main manuscript, an abstract does not contain references.

At the end of each abstract, authors must define 4–6 keywords to ensure that the article is easily found in relevant search engines.

Checklist for writing an abstract

- An abstract is a representative summary of a manuscript that is freely available and therefore widely read.
- The abstract should not contain information that is not further elaborated in the manuscript.
- Irrespective of the structural requirements, the aim of the study, the description of the methodology, the main results, the conclusions drawn from them, and the clinical/scientific relevance should be presented briefly and concisely.
- Abstracts are written in the past tense and in the third person, and are usually 300–400 words long.

Corresponding address

PD Dr. Elmar Herbst
Department of Trauma, Hand and Reconstructive Surgery, University Hospital Muenster, University of Muenster
Albert-Schweitzer-Campus 1, 48149 Muenster, Germany
elmar.herbst@gmail.com

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Declarations

Conflict of interest. E. Herbst, S. Kopf, and the AGA Research Committee declare that they have no competing interests.

Zusammenfassung

Schreiben eines Abstracts

Die Zusammenfassung ist der wichtigste Teil eines Manuskripts, da er wohl am häufigsten gelesen wird. Grundsätzlich müssen unstrukturierte von strukturierten Abstracts unterschieden werden. Bei Letzteren wird eine klare Struktur (z. B. Hintergrund, Ziel der Arbeit, Methodik, Ergebnisse, Schlussfolgerungen) vorgeben. Bei unstrukturierten Abstracts fehlt diese offensichtliche Struktur. Allerdings werden Abstracts in derselben Art und Weise geschrieben. Beim Schreiben von Abstracts sollte dies in der Vergangenheitsform und in der dritten Person erfolgen, wobei insgesamt die Vorgaben der Fachjournale oder wissenschaftlichen Kongresse berücksichtigt werden müssen. Wichtig ist, dass die Hauptaussagen aus dem Hauptmanuskript auch so im Abstract transportiert werden und dass keine neuen oder unwichtigen Informationen diskutiert werden. Im vorliegenden Beitrag werden Tipps und Tricks genannt, wie die einzelnen Teile eines Abstracts verfasst werden können.

Schlüsselwörter
Forschung · Methoden · Publikationen · Wissenschaft · Kongress · Zusammenfassung

For this article no studies with human participants or animals were performed by any of the authors. All studies mentioned were in accordance with the ethical standards indicated in each case.

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