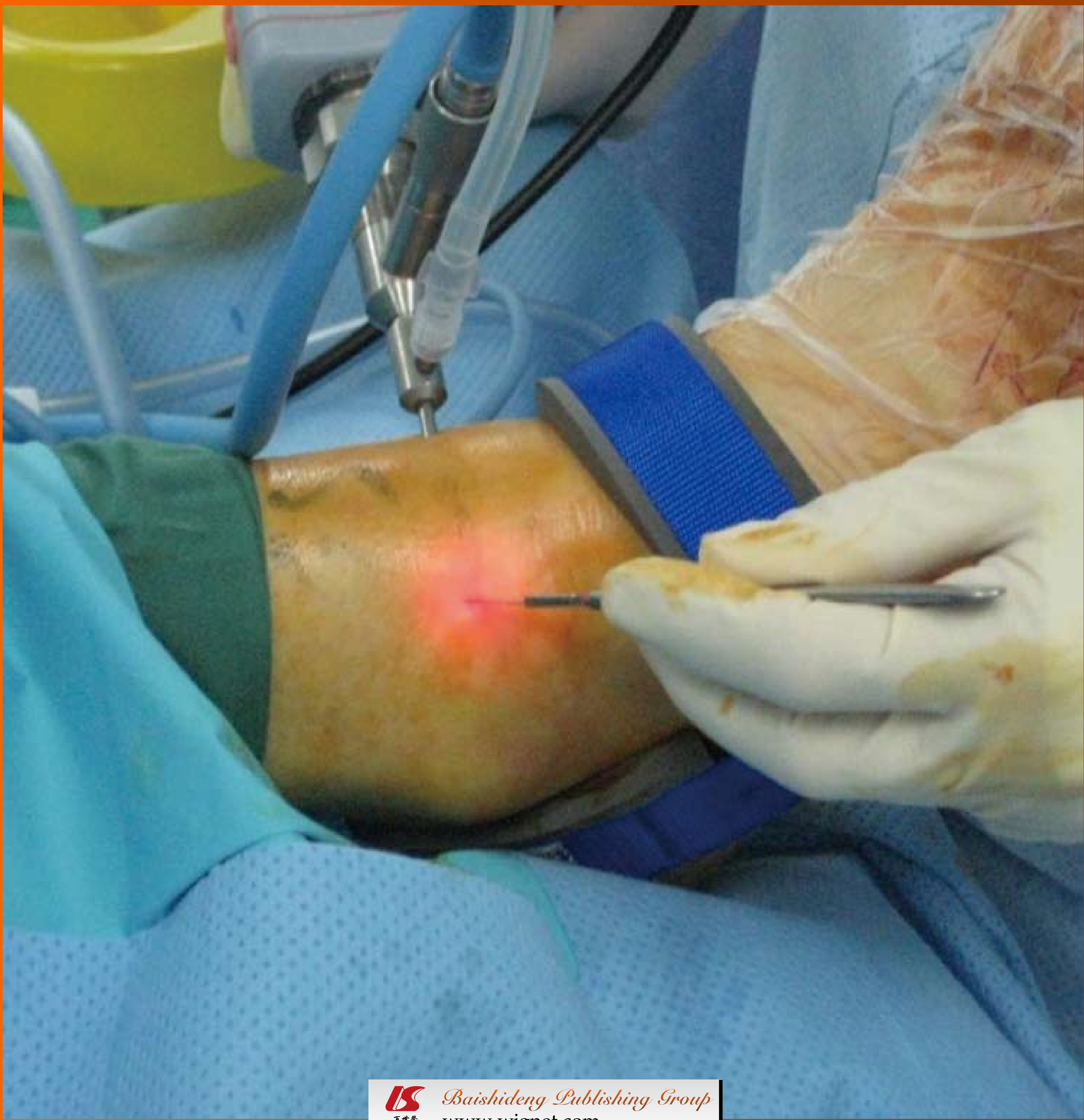
ISSN 2218-5836 (online)

World Journal of *Orthopedics*

World J Orthop 2011 April 18; 2(4): 31-36



WJO

World Journal of Orthopedics

A peer-reviewed, online, open-access journal of orthopedics

Editorial Board

2010-2014

World Journal of
Orthopedics

Contents

Monthly Volume 2 Number 4 April 18, 2011

ABOUT COVER

Slater GL, Pino AE, O'Malley M. Delayed reconstruction of lateral complex structures of the ankle. *World J Orthop* 2011; 2(4): 31-36
http://www.wjgnet.com/2218-5836/full /v2/i4/31.htm

AIM AND SCOPE

World Journal of Orthopedics (*World J Orthop*, *WJO*, online ISSN 2218-5836, DOI: 10.5312) is a monthly peer-reviewed, online, open-access, journal supported by an editorial board consisting of 122 experts in orthopedics from 30 countries.

The aim of *WJO* is to report rapidly new theories, methods and techniques for prevention, diagnosis, treatment, rehabilitation and nursing in the field of orthopedics. *WJO* covers diagnostic imaging, arthroscopy, evidence-based medicine, epidemiology, nursing, sports medicine, therapy of bone and spinal diseases, bone trauma, osteoarthropathy, bone tumors and osteoporosis, minimally invasive therapy, traditional medicine, and integrated Chinese and Western medicine. The journal also publishes original articles and reviews that report the results of applied and basic research in fields related to orthopedics, such as immunology, physiopathology, cell biology, pharmacology, medical genetics, and pharmacology of Chinese herbs.

EDITORS FOR THIS ISSUE

Responsible Assistant Editor: *Le Zhang*
Responsible Electronic Editor: *Hong Sun*
Proofing Editor-in-Chief: *Lian-Sheng Ma*
Responsible Science Editor: *Hong Sun*
Proofing Editorial Office Director: *Hong Sun*

NAME OF JOURNAL
World Journal of Orthopedics

LAUNCH DATE
November 18, 2010

SPONSOR
Beijing Baishideng BioMed Scientific Co., Ltd.
Room 903, Building D, Ocean International Center,
No. 62 Dongsihuan Zhonglu, Chaoyang District,
Beijing 100025, China
Telephone: +86-10-8538-1892
Fax: +86-10-8538-1893
E-mail: baishideng@wjgnet.com
http://www.wjgnet.com

EDITING
Editorial Board of *World Journal of Orthopedics*
Room 903, Building D, Ocean International Center,
No. 62 Dongsihuan Zhonglu, Chaoyang District,
Beijing 100025, China
Telephone: +86-10-5908-0036
Fax: +86-10-8538-1893
E-mail: wjo@wjgnet.com
http://www.wjgnet.com

PUBLISHING
Baishideng Publishing Group Co., Limited
Room 1701, 17/F, Henan Building,
No.90 Jaffe Road, Wanchai, Hong Kong, China
Fax: 00852-3115-8812
Telephone: 00852-5804-2046
E-mail: baishideng@wjgnet.com
http://www.wjgnet.com

SUBSCRIPTION
Beijing Baishideng BioMed Scientific Co., Ltd.
Room 903, Building D, Ocean International Center,
No. 62 Dongsihuan Zhonglu, Chaoyang District,
Beijing 100025, China
Telephone: +86-10-8538-1892
Fax: +86-10-8538-1893
E-mail: baishideng@wjgnet.com
http://www.wjgnet.com

ONLINE SUBSCRIPTION
One-Year Price 216.00 USD

PUBLICATION DATE
April 18, 2011

ISSN
ISSN 2218-5836 (online)

PRESIDENT AND EDITOR-IN-CHIEF
Lian-Sheng Ma, *Beijing*

STRATEGY ASSOCIATE EDITORS-IN-CHIEF
Enrico Pola, *Rome*
Masato Takao, *Tokyo*
James F Griffth, *Hong Kong*
Thomas W Kaminski, *Newark*
Jenni M Buckley, *San Francisco*
Vijay K Goel, *Toledo*

EDITORIAL OFFICE
Hong Sun, Director
World Journal of Orthopedics
Room 903, Building D, Ocean International Center,
No. 62 Dongsihuan Zhonglu, Chaoyang District,
Beijing 100025, China
Telephone: +86-10-5908-1630
Fax: +86-10-8538-1893
E-mail: wjo@wjgnet.com
http://www.wjgnet.com

INSTRUCTIONS TO AUTHORS
Full instructions are available online at http://www.wjgnet.com/2218-5836/g_info_20100722172650.htm.

ONLINE SUBMISSION
http://www.wjgnet.com/2218-5836office

World Journal of Orthopedics

Online Submissions: http://www.wjgnet.com/2218-5836office
wjo@wjgnet.com
doi:10.5312/wjo.v2.i4.31

World J Orthop 2011 April 18; 2(4): 31-36
ISSN 2218-5836 (online)

BRIEF ARTICLE

Delayed reconstruction of lateral complex structures of the ankle

Gordon L Slater, Alejandro E Pino, Martin O'Malley

Gordon L Slater, Sports Foot and Ankle Surgery, Edgecliff Sydney NSW 2027, Australia
Alejandro E Pino, Hospital for Special Surgery, Department of Foot and Ankle Surgery, 535 E 70 St., New York, NY 10021, United States
Martin O'Malley, Hospital for Special Surgery, Department of Foot and Ankle Surgery, 535 E 70th St., New York, NY 10021, United States
Author contributions: Slater GL, Pino AE and O'Malley M contributed equally to writing this work; Slater GL contributed data.
Correspondence to: Gordon L Slater, MD, Sports Foot and Ankle Surgery, Level 2, Suite 211, 204-233 New South Head Road, Edgecliff NSW 2027, Australia. gslater@jakll.com.au
Telephone: +61-1300388778 **Fax:** +61-60409555
Received: December 29, 2010 **Revised:** April 8, 2011
Accepted: April 15, 2011
Published online: April 18, 2011

Abstract

Lateral ankle instability is one of the most common and well-recognized conditions presenting to foot and ankle surgeons. It may exist as an isolated entity or in conjunction with other concomitant pathology, making it important to appropriately diagnose and identify other conditions that may need to be addressed as part of treatment. These associated conditions may be a source of chronic pain, even when the instability has been appropriately treated, or may lead to failure of treatment by predisposing the patient to ankle inversion injuries. The primary goal of this editorial is to provide a brief summary of the common techniques used in the delayed reconstruction of lateral ankle ligamentous injuries and present a method we have successfully employed for over 15 years. We will also briefly discuss the diagnosis and treatment of the more common associated conditions, which are important to identify to achieve satisfactory results for the patient. We present the outcomes of 250 consecutive reconstructions performed over the last 10 years and describe our operative technique for addressing lateral ankle ligamentous injuries.

Key words: Lateral ankle ligaments; Ankle instability; Ankle ligament reconstruction; Anatomic ligament reconstruction; Ankle sprain

Peer reviewer: Evangelos Pappas, MD, PhD, Professor, Associate Professor, Division of Physical Therapy, Long Island University-Brooklyn Campus, Brooklyn, NY 11201, United States

Slater GL, Pino AE, O'Malley M. Delayed reconstruction of lateral complex structures of the ankle. *World J Orthop* 2011; 2(4): 31-36 Available from: URL: http://www.wjgnet.com/2218-5836/full/v2/i4/31.htm DOI: http://dx.doi.org/10.5312/wjo.v2.i4.31

INTRODUCTION

Ankle instability is one of the most common conditions treated by orthopedic surgeons, especially those specializing in conditions of the foot and ankle or sports medicine[1,2]. It is generally accepted that the majority of these injuries can be treated successfully with conservative measures, yet there remains a percentage of patients that go on to suffer from sequelae of the injury. Most patients with chronic complaints stemming from the initial event, found to be as high as 20% of individuals sustaining twisting injuries, complain of stiffness or various patterns of instability[3-5]. These chronic conditions can usually be treated with conservative modalities and are tolerated well by the majority of patients but, in the case of gross instability or high patient activity level, surgical intervention may be warranted. Recent literature has found an association between ankle instability and the development of osteoarthritis, which may be a cause of prolonged and worsening symptoms after neglected ankle instability[6,7]. Determining which patients may go on to chronic instability and the appropriate time to intervene with more aggressive forms of treatment continues to be a challenge for treating physicians.

PATHOGENESIS

Colville described reconstruction of the lateral ligamentous complex of the ankle after a combined inversion-plantar flexion injury of the foot, which led to rupture of the ankle joint capsule, anterior talofibular ligament (ATFL) and the calcaneofibular ligament (CFL)[8]. Brostrom, well known for his contribution to the diagnosis and treatment of ankle instability, found that 27% of patients evaluated for ankle injuries with ATFL disruption had concomitant CFL involvement. Fifty eight percent of these patients had increased inversion of the ankle when compared to the uninvolved extremity[9].

Advanced imaging may not be necessary in the evaluation of all patients with ankle inversion injuries but, when obtained, rarely show injury to the posterior talofibular ligament, even in the setting of ATFL and CFL disruption[10]. On the other hand, MRI evidence of ATFL disruption may not be clinically significant. MRI has proven useful in the evaluation of chronic ankle discomfort after recurrent ankle injuries, especially when attempting to identify associated injuries, such as osteochondral injuries or peroneal pathology. One should keep in mind, however, that a normal MRI does not preclude ankle instability.

DIAGNOSIS

Patients with ankle instability typically present for treatment after sustaining a severe twisting injury which has progressed to recurrent sprains. The severity of the injury has been linked to the clinical presentation, such that those patients who are unable to bear weight or return to sport immediately after the injury or have difficulty walking on uneven surfaces usually have, at the very least, a complete rupture of the ATFL[11].

Diagnosis is typically based on clinical findings and is made when there is increased laxity on anterior drawer and inversion testing compared to the contralateral ankle. An attempt to isolate rotational instability of the ankle helps to identify if there is an injury to the syndesmosis. Other findings in these high ankle sprains include inability to perform a single leg hop on the involved side, a positive squeeze test and pain with external rotation of the ankle. Some advocate the use of stress radiographs in the workup of ankle laxity, while others question the validity of this modality[12-19]. The use of the Telos device aims to more objectively quantify the degree of instability[16, 17].

In order to ensure optimal results in treating patients with ankle instability, it is of utmost importance to identify and treat pathology that may be a result of, or lead to, ankle instability. Examples of associated pathology include osteochondral defects, peroneal injuries and neurological conditions leading to muscle imbalance. The heel should be examined for proper alignment because varus malalignment may lead to recurrent injuries after treatment, or failure of ligamentous reconstruction.

Most advocate conservative treatment for acute ligamentous injuries although there is some evidence that suggests that early surgical intervention leads to a lower incidence of chronic instability[3,9,20-22]. There is no reliable objective criteria that we are aware of that can be used to help dictate whether one will proceed to chronic instability after an acute injury. Once a patient does present with these symptoms after failure of conservative means, surgery should be considered. Such complaints in patients with high activity levels, when combined with positive findings on physical exam, may best be addressed with surgical reconstruction of the injured ligaments.

SURGICAL OPTIONS

The surgical treatment of lateral ligamentous injuries can be classified as either anatomic or non-anatomic reconstructions. Brostrom popularized an anatomic technique for the repair of ligamentous injuries, while Kalsson *et al* found that a delayed anatomic reconstruction was also possible[9,17]. These reconstructions aim at re-establishing continuity to both the ATFL and CFL through direct repair, which may further be augmented with an imbrication of the inferior retinaculum[23]. Longitudinal, transverse and oblique incisions have been described and selection should be dictated by any associated pathology[24]. Typically on gross examination a redundant and incompetent ligamentous complex is identified. The ligaments should be identified and directly repaired at a length that provides sufficient tension to stabilize the ankle.

Non-anatomic ligamentous reconstructions, such as the Evans, Watson-Jones and Chrisman-Snook procedures, have been described in the literature[10,25-32]. These procedures involve rerouting of a slip of autogenously harvested tendon to impart stability to the ankle and subtalar joint. Stiffness, arthritis and complications associated with tendon harvest have been attributed to these techniques, yet they may still have an important role in ligamentous reconstruction. Non-anatomic reconstructions may best be suited for those patients with long-standing instability, hypermobility or a failed anatomic repair[17].

Unlike the original technique described by Brostrom, our preferred approach to lateral ankle ligament reconstruction is to begin with an arthroscopic evaluation and treatment (Figure 1) of any intraarticular pathology, when indicated. This is undertaken with a 2.7 mm arthroscope and a low-pressure calf tourniquet. The joint and syndesmosis are inspected and articular injuries or intraarticular scar formation may be addressed. Any gross instability of the syndesmosis may need to be addressed with a separate stabilization technique, which is outside the scope of this editorial. When peroneal pathology is identified through a thorough preoperative evaluation, a posterolateral portal

Figure 1 Portal Placement and set-up for ankle arthroscopy.

Figure 2 Placement of a curved, anteriolateral skin incision between the superficial peroneal nerve and peroneals, just distal to the fibula.

may be used for tendoscopy and tendon debridement or for a more thorough evaluation when the preoperative evaluation was equivocal. This portal may later be incorporated into a longitudinal incision for ligamentous reconstruction, which allows for treatment of any peroneal pathology in an open fashion.

SURGICAL TECHNIQUE

Our incision is dictated by other pathology and ensures exposure of the lateral ligamentous complex, inferior retinaculum and the peroneal tendons, if necessary (Figure 2). Dissection through the subcutaneous tissue is performed in line with the incision, protecting any branches of the superficial peroneal nerve when identified (Figures 3A and 3B). The ATFL, CFL and anterior joint capsule are identified, allowing for mobilization and retraction of the inferior retinaculum. Careful dissection is made at the level of the CFL in order to prevent injury to the peroneal tendons. The anterior joint capsule is then incised transversely, leaving a stump of capsule attached to the fibula for later repair. The ankle joint may now be

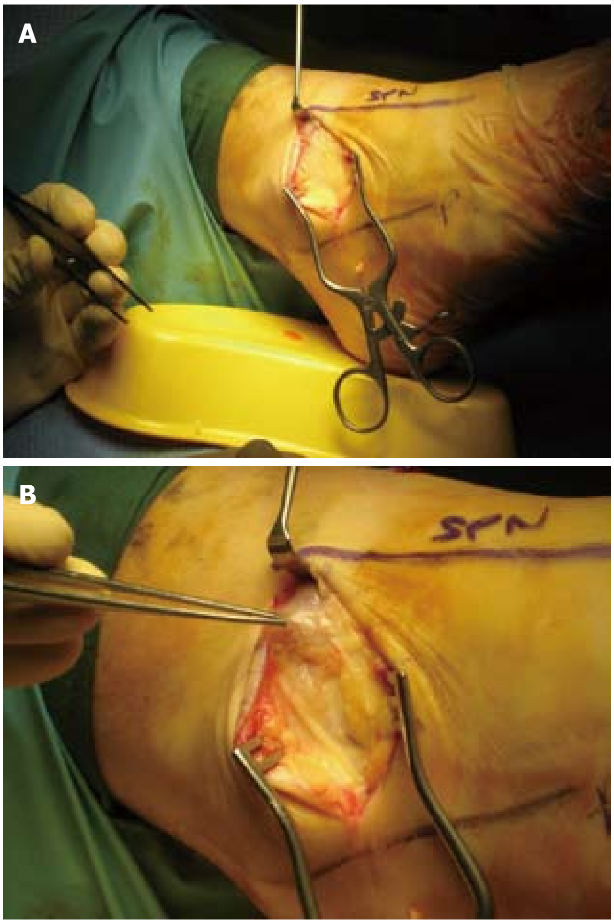


Figure 3 Identification (A) and isolation (B) of a branch of the superficial peroneal nerve.

explored if arthroscopy was not first performed.

Reconstruction is then begun with placement of multiple, interrupted, nonabsorbable sutures in the capsule, ATFL and CFL, allowing for later sequential imbrication (Figure 4). The sutures are tied with the foot positioned in an eversion, followed by advancement of the inferior retinaculum over the imbricated repair (Figure 5), which is secured to the fibula with suture or suture anchor. A layered closure is then performed, followed by placement of a soft dressing and a supportive boot or splint.

Two hundred and fifty patients who underwent surgical reconstruction of their lateral ligamentous structures by a single surgeon between 1998 and 2008 were contacted for interview. Patients were included in the study if they underwent lateral ankle ligament reconstruction due to symptomatic instability with sporting activity and activities of daily living despite a course of conservative management. All patients had more than three instances of what they considered significant instability, with findings on physical exam that included ecchymosis, diffuse soft tissue swelling, pain along the course of the ATFL and CFL and an inability to bear weight immediately after the injury. The majority of patients in this study listed Australian Rules football, basketball, netball or soccer as the sporting activity during which the initial injury occurred.

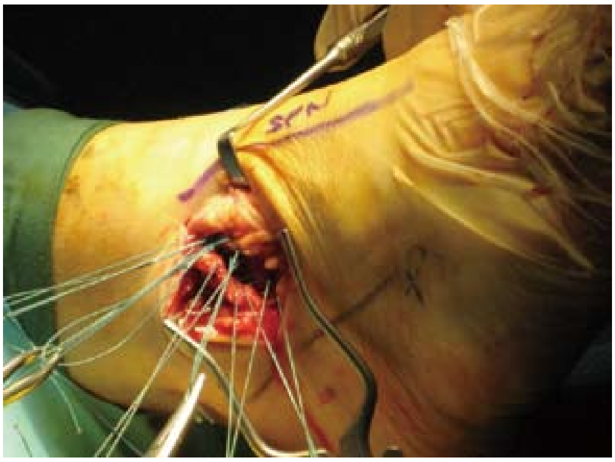


Figure 4 Interrupted suture placement in the lateral ligamentous complex.

Figure 5 Imbrication of the lateral structures with a retinacular reinforcement.

Patients with a varus heel alignment or peroneal weakness due to a neurologic condition were excluded from the study.

The most commonly encountered concomitant injuries at the time of lateral ligamentous reconstruction included intraarticular synovitis, hypertrophy of the ATFL leading to impingement and discrete osteochondral injuries. Any area of synovitis or soft tissue impingement was treated with arthroscopic debridement, while osteochondral lesions were generally small and amenable to debridement and osteoplasty.

The female to male ratio was 1:2, with a mean age of 34.47 (range 9-90). The patients were asked a series of questions in regard to postoperative pain and function, with 2.25% of patients admitting to residual pain. Two of these patients had a Brostrom procedure in conjunction with internal fixation of an ankle fracture. The remainder of the patients remain pain free at their most recent evaluation. The overall satisfaction rate was 91%.

The majority of patients denied continued instability, with 78% returning to activities without recurrence of inversion injuries. Of the remaining patients, 13% returned to a pre-injury level of activity with some residual instability, while 9% were limited in their ability to return to activity by continued instability.

The delayed reconstruction of the lateral ankle ligamentous complex is a well-established technique for the surgical management of ankle instability. The authors prefer an anatomic repair, with the addition of retinaculum advancement, as described by Brostrom and Gould[9,23]. Satisfactory reports have been described with the use of non-anatomic, tendon weaving repairs, but we feel that these techniques should be reserved for salvage cases due the associated complications, such as stiffness and sacrifice of a portion of the peroneals[25,26,28,30-32]. The peroneals are important stabilizers of the hindfoot and play a vital role in eversion of the foot and maintenance of the longitudinal arch. Harvesting of the peroneal tendons has been associated with loss of strength in approximately 8% of patients[33].

In order to ensure optimal results from ligament reconstruction, it is important to identify and address any factors that may predispose the patient to recurrent instability, such as varus heel malalignment and peroneal injuries. Other factors that may lead to poor results after surgical intervention include unrecognized concomitant pathology, such as articular cartilage injuries, unrecognised fractures, ankle synovitis or soft tissue impingement. In our experience, the addition of an arthroscopic examination aids in the diagnosis and treatment of these intraarticular conditions that may predispose patients to poor outcomes if not appropriately addressed.

In the current series, the most commonly encountered intraarticular injuries included areas of soft tissue impingement and osteochondral lesions. A recent study investigated causes for residual disability after ankle sprains in an attempt to compare the ability of arthroscopy to diagnosis pathology versus standard and advanced imaging[34]. The authors found arthroscopy to be as good in identifying intraarticular pathology as other imaging and able to identify missed lesions in 14 of 72 patients. Fifty-four percent of patients had ATFL injuries, 40.3% had osteochondral lesions and 4.2% of patients had impingement due to fibrous bands. Of those patients with impingement due to fibrous bands, arthroscopy was the only means of detecting the abnormality. A similar study in which arthroscopy was used to detect pathology in chronically unstable ankles found osteochondral injuries in 66% of patients and elongation of the ATFL and CFL in 86% and 64% of patients respectively[35].

Ankle inversion injuries continue to be a common condition, with a minority of patients progressing to chronic pain and instability. The diagnosis and treatment of this condition is well described, but the literature is limited to small series with limited follow-up. We present our experience with ankle instability in the form of disruption of the lateral ankle ligamentous complex in order to illustrate that good long term results can be anticipated in appropriately selected patients with an anatomic reconstruction, as long as all pathology is identified and addressed.

The treating physician should be knowledgeable in terms of other injuries commonly associated with lateral ankle ligamentous injuries in order to properly evaluate and care for their patients.

COMMENTS

Background

Ankle sprains are among the most common musculoskeletal injuries seen by physicians. The majority of these injuries have satisfactory outcomes with the use of conservative treatments, but in the face of continued instability and patient limitation in spite of such intervention, surgical reconstruction of the lateral ligament complex may be warranted. In our experience, good long- term outcomes can be obtained with the use of an anatomic reconstruction of the lateral ligaments of the ankle.

Research frontiers

There has been some debate as to wether an anatomic or nonanatomic reconstruction of the lateral ligaments yields better results. Nonanatomic reconstructions have been associated with more hindfoot stiffness, and usually sacrifice a portion of the peroneals. There has also been some controversy in regards to the use of arthroscopy in the treatment of ankle instability, which we believe is an important tool, when used appropriately, in the treatment of chronic lateral ligament dysfunction.

Innovations and breakthroughs

Many researchers have found good short-term results with the use of an anatomic reconstruction of the lateral ligaments of the ankle. We have shown that the majority of our patients continue to have a high satisfaction rate at ten-year follow-up, with 91% returning to a pre-injury functional level. We also present the directed use of arthroscopy as an important tool in the treatment of concomitant injuries associated with chronic ankle instability.

Applications

The use of an anatomic approach to the reconstruction of the lateral ligaments of the ankle in our practice, when combined with an arthroscopic treatment of any intraarticular pathology, when indicated, has led to a high patient satisfaction rate.

Terminology

Lateral ligament complex: anterior talofibular ligament (ATFL) and the calcaneofibular ligament (CFL). Modified Brostrom: Anatomic repair of the ATFL and CFL, with imbrication of the inferior retinaculum. Directed arthroscopy: Arthroscopic treatment of concomitant pathology identified preoperatively with a thorough history and physical exam, in conjunction with the use of appropriate diagnostic modalities.

Peer review

Overall, this was an interesting editorial on the author's preferred treatment of ankle instability which will be of interest to readership.

REFERENCES

1 **Brand RL**, Black HM, Cox JS. The natural history of inadequately treated ankle sprain. *Am J Sports Med* 1977; **5**: 248-249

2 **Glick JM**, Gordon RB, Nishimoto D. The prevention and treatment of ankle injuries. *Am J Sports Med* 1976; **4**: 136-141

3 **Freeman MA**. Treatment of ruptures of the lateral ligament of the ankle. *J Bone Joint Surg Br* 1965; **47**: 661-668

4 **Kannus P**, Renström P. Treatment for acute tears of the lateral ligaments of the ankle. Operation, cast, or early controlled mobilization. *J Bone Joint Surg Am* 1991; **73**: 305-312

5 **Pennal GF**. Subluxation of the Ankle. *Can Med Assoc J* 1943; **49**: 92-95

6 **Sugimoto K**, Takakura Y, Okahashi K, Samoto N, Kawate K, Iwai M. Chondral injuries of the ankle with recurrent lateral instability: an arthroscopic study. *J Bone Joint Surg Am* 2009; **91**: 99-106

7 **Valderrabano V**, Hintermann B, Horisberger M, Fung TS. Ligamentous posttraumatic ankle osteoarthritis. *Am J Sports Med* 2006; **34**: 612-620

8 **Colville MR**. Reconstruction of the lateral ankle ligaments. *Instr Course Lect* 1995; **44**: 341-348

9 **Broström L**. Sprained ankles. V. Treatment and prognosis in recent ligament ruptures. *Acta Chir Scand* 1966; **132**: 537-550

10 **Saltrick KR**. Lateral ankle stabilization. Modified Lee and Chrisman-Snook. *Clin Podiatr Med Surg* 1991; **8**: 579-600

11 **Balduini FC**, Vegso JJ, Torg JS, Torg E. Management and rehabilitation of ligamentous injuries to the ankle. *Sports Med* 1987; **4**: 364-380

12 **Ahovuo J**, Kaartinen E, Slätis P. Diagnostic value of stress radiography in lesions of the lateral ligaments of the ankle. *Acta Radiol* 1988; **29**: 711-714

13 **Bulucu C**, Thomas KA, Halvorson TL, Cook SD. Biomechanical evaluation of the anterior drawer test: the contribution of the lateral ankle ligaments. *Foot Ankle* 1991; **11**: 389-393

14 **Laurin C**, Mathieu J. Sagittal mobility of the normal ankle. *Clin Orthop Relat Res* 1975; : 99-104

15 **Rijke AM**, Vierhout PA. Graded stress radiography in acute injury to the lateral ligaments of the ankle. *Acta Radiol* 1990; **31**: 151-155

16 **Sauser DD**, Nelson RC, Lavine MH, Wu CW. Acute injuries of the lateral ligaments of the ankle: comparison of stress radiography and arthrography. *Radiology* 1983; **148**: 653-657

17 **Karlsson J**, Bergsten T, Lansinger O, Peterson L. Reconstruction of the lateral ligaments of the ankle for chronic lateral instability. *J Bone Joint Surg Am* 1988; **70**: 581-588

18 **Rijke AM**, Jones B, Vierhout PA. Injury to the lateral ankle ligaments of athletes. A posttraumatic followup. *Am J Sports Med* 1988; **16**: 256-259

19 **Cox JS**, Hewes TF. "Normal" talar tilt angle. *Clin Orthop Relat Res* 1979; **140** : 37-41

20 **Anderson KJ**, Lecocq JF. Operative treatment of injury to the fibular collateral ligament of the ankle. *J Bone Joint Surg Am* 1954; **36**-A: 825-832

21 **Grønmark T**, Johnsen O, Kogstad O. Rupture of the lateral ligaments of the ankle: a controlled clinical trial. *Injury* 1980; **11**: 215-218

22 **Kolind-Sorensen V**. [Lesions of the lateral ligament of the ankle joint]. *Ugeskr Laeger* 1975; **137**: 1637-1638

23 **Gould N**, Seligson D, Gassman J. Early and late repair of lateral ligament of the ankle. *Foot Ankle* 1980; **1**: 84-89

24 **Sobel M**, Warren RF, Brourman S. Lateral ankle instability associated with dislocation of the peroneal tendons treated by the Chrisman-Snook procedure. A case report and literature review. *Am J Sports Med* 1990; **18**: 539-543

25 **Watson-Jones R**. The classic: "Fractures and Joint Injuries" by Sir Reginald Watson-Jones, taken from "Fractures and Joint Injuries," by R. Watson-Jones, Vol. II, 4th ed., Baltimore, Williams and Wilkins Company, 1955. *Clin Orthop Relat Res* 1974; **105** : 4-10

26 **van der Rijt AJ**, Evans GA. The long-term results of Watson-Jones tenodesis. *J Bone Joint Surg Br* 1984; **66**: 371-375

27 **Snook GA**, Chrisman OD, Wilson TC. Long-term results of the Chrisman-Snook operation for reconstruction of the lateral ligaments of the ankle. *J Bone Joint Surg Am* 1985; **67**: 1-7

28 **Chrisman OD**, Snook GA. Reconstruction of lateral ligament tears of the ankle. An experimental study and clinical evaluation of seven patients treated by a new modification of the Elmslie procedure. *J Bone Joint Surg Am* 1969; **51**: 904-912

29 **EVANS DL**. Recurrent instability of the ankle; a method of surgical treatment. *Proc R Soc Med* 1953; **46**: 343-344

30 **Gillespie HS**, Boucher P. Watson-Jones repair of lateral instability of the ankle. *J Bone Joint Surg Am* 1971; **53**: 920-924

31 **Hedeboe J**, Johannsen A. Recurrent instability of the ankle joint. Surgical repair by the Watson-Jones method. *Acta Orthop Scand* 1979; **50**: 337-340

32 **Liu SH**, Baker CL. Comparison of lateral ankle ligamentous

reconstruction procedures. *Am J Sports Med* 1994; **22**: 313-317
33 **St Pierre RK**, Andrews L, Allman F Jr, Fleming LL. The Cybex II evaluation of lateral ankle ligamentous reconstructions. *Am J Sports Med* 1984; **12**: 52-56
34 **Takao M**, Uchio Y, Naito K, Fukazawa I, Ochi M. Arthroscopic assessment for intra-articular disorders in residual ankle disability after sprain. *Am J Sports Med* 2005; **33**: 686-692
35 **Hintermann B**, Boss A, Schäfer D. Arthroscopic findings in patients with chronic ankle instability. *Am J Sports Med* 2002; **30**: 402-409

S- Editor Sun H **L- Editor** Roemmele A **E- Editor** Sun H

WJO
World Journal of Orthopedics

Online Submissions: http://www.wjgnet.com/2218-5836office
wjo@wjgnet.com
www.wjgnet.com

World J Orthop 2011 April 18; 2(4): I
ISSN 2218-5836 (online)

ACKNOWLEDGMENTS

Acknowledgments to reviewers of *World Journal of Orthopedics*

Many reviewers have contributed their expertise and time to the peer review, a critical process to ensure the quality of *World Journal of Orthopedics*. The editors and authors of the articles submitted to the journal are grateful to the following reviewers for evaluating the articles (including those published in this issue and those rejected for this issue) during the last editing time period.

Evangelos Pappas, MD, PhD, Professor, Associate Professor, Division of Physical Therapy, Long Island University-Brooklyn Campus, Brooklyn, NY 11201, United States

Christopher J Colloca, DC, CEO and Founder, Neuromechanical Innovations, Graduate Student, Department of Kinesiology, Arizona State University, 101 South Roosevelt Avenue, Chandler, AZ 85226, United States

Florian Kutscha-Lissberg, MD, Department for Traumasurgery, Medical University of Vienna, Währinger Gürtel 18-20, A-1090 Vienna, Austria

Olivier Bruyere, BRUYERE, PhD, Adjunct Professor Olivier, University of Liege, CHU Sart-Tilman, Bât B23, 4000 Liege, Belgium

Richard E Buckley, MD, FRCS(C), Professor, Specialist In Orthopaedic Surgery, Head-Orthopaedic Trauma Surgery, University of Calgary, Foothills Medical Centre, AC144A 1403-29th St NW, Calgary AB T2N 2T9, Canada

World Journal of Orthopedics

Online Submissions: http://www.wjgnet.com/2218-5836office
wjo@wjgnet.com
www.wjgnet.com

World J Orthop 2011 April 18; 2(4): I
ISSN 2218-5836 (online)

MEETING

Events Calendar 2011

January 16-20, 2011
Combined 4th International Conference of the Saudi Orthopaedic Association & SICOT Trainee Day, Abha, Saudi Arabia

January 24-27, 2011
7th Middle East Orthopaedics Conference 2011, Dubai International Convention Centre, Dubai, Saudi Arabia

January 28-30, 2011
National Orthopedic Conference 2011, San Francisco, California, United States

February 15-19, 2011
American Academy of Orthopaedic Surgeons, San Diego, CA, United States

February 16-20, 2011
2011 Annual Meeting of the American Academy of Orthopaedic Surgeons, San Diego, CA, United States

February 19, 2011
Pediatric Orthopaedic Society of North America Specialty Day, San Diego, CA, United States

March 09-11, 2011
Annual London Imperial Spine Course, London, United Kingdom

March 21-25, 2011
31st Caribbean Orthopaedic Meeting, Anse Marcel, Saint Martin

March 28-April 02, 2011
The Association of Children's Prosthetic-Orthotic Clinics 2011 Annual Meeting, Park City, UT, United States

April 01-04, 2011
Ain Shams 2nd Orthopaedic intensive course (Orthopaedics from A to Z), Cairo, Egypt

April 20-22, 2011
IMUKA 2011: Masterclass in Arthroscopy and Related Surgery, Maastricht, Netherlands

May 11-14, 2011
2011 POSNA Annual Meeting, Montreal, Quebec, Canada

May 12-15, 2011
84th Annual Meeting of the Japanese Orthopaedic Association, Yokohama, Japan

May 15-19, 2011
8th Biennial ISAKOS Congress (International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine), Rio de Janeiro, Brazil

May 25-28, 2011
16th Pan Arab Orthopedic Association Congress & 27th SOTCOT Congress, Tunis, Tunisia

June 01-04, 2011
12th EFORT Congress in cooperation with the Danish Orthopaedic Association (European Federation of National Associations of Orthopaedics and Traumatology), Copenhagen, Denmark

June 08-12, 2011
2011 ABJS Annual Meeting (Association of Bone and Joint Surgeons), Dublin, Ireland

June 15-18, 2011
11th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, London, United Kingdom

July 07-09, 2011
66th Annual Meeting of the Canadian Orthopaedic Association, St. John's, Newfoundland and Labrador, Canada

July 13-16, 2011
18th International Meeting on Advanced Spine Techniques, Copenhagen, Denmark

July 22-24, 2011
Sri Sathya Sai International Orthopaedic Conference- 2011 0n Pelvis And Lower Extremity Trauma", Sri Sathya Sai Institute of Higher Medical Sciences, Prasanthigram, Puttaparthi, Andhra Pradesh, India

July 25-28, 2011
2011 Update in Orthopaedics, Grand Wailea Hotel Resort & Spa,Wailea, Maui, Hawaii, United States

September 06-09, 2011
SICOT 2011 XXV Triennial World Congress, Prague, Czech Republic

September 13-16, 2011
BOA/IOA Combined Meeting(British Orthopaedic Association & Irish Orthopaedic Association), Dublin, Ireland

September 14-17, 2011
23rd SECEC-ESSSE Congress (European Society for Surgery of the Shoulder and the Elbow), Lyon, France

September 14-17, 2011
46th SRS Annual Meeting & Course (Scoliosis Research Society), Louisville, Kentucky, United States

September 15-18, 2011
2011 World Congress on Osteoarthritis, San Diego, California 92167, United States

September 21-23, 2011
HIP IMPROVEMENTS AND PROCEEDINGS, Toulouse, France

October 25-28, 2011
DKOU 2011-Deutscher Kongress für Orthopädie und Unfallchirurgie, Berlin, Germany

November 7-11, 2011
86ème Réunion Annuelle SOFCOT, Paris, France

December 12-15, 2011
EOA 63rd Annual International Conference, Cairo, Egypt

WJO World Journal of Orthopedics

Online Submissions: http://www.wjgnet.com/2218-5836office
wjo@wjgnet.com
www.wjgnet.com

World J Orthop 2011 April 18; 2(4): I-V
ISSN 2218-5836 (online)

INSTRUCTIONS TO AUTHORS

GENERAL INFORMATION

World Journal of Orthopedics (*World J Orthop*, *WJO*, online ISSN 2218-5836, DOI: 10.5312) is a monthly peer-reviewed, online, open-access (OA), journal supported by an editorial board consisting of 122 experts in orthopedics from 30 countries.

The biggest advantage of the OA model is that it provides free, full-text articles in PDF and other formats for experts and the public without registration, which eliminates the obstacle that traditional journals possess and usually delays the speed of the propagation and communication of scientific research results. The open access model has been proven to be a true approach that may achieve the ultimate goal of the journals, i.e. the maximization of the value to the readers, authors and society.

Maximization of personal benefits

The role of academic journals is to exhibit the scientific levels of a country, a university, a center, a department, and even a scientist, and build an important bridge for communication between scientists and the public. As we all know, the significance of the publication of scientific articles lies not only in disseminating and communicating innovative scientific achievements and academic views, as well as promoting the application of scientific achievements, but also in formally recognizing the "priority" and "copyright" of innovative achievements published, as well as evaluating research performance and academic levels. So, to realize these desired attributes of *WJO* and create a well-recognized journal, the following four types of personal benefits should be maximized. The maximization of personal benefits refers to the pursuit of the maximum personal benefits in a well-considered optimal manner without violation of the laws, ethical rules and the benefits of others. (1) Maximization of the benefits of editorial board members: The primary task of editorial board members is to give a peer review of an unpublished scientific article via online office system to evaluate its innovativeness, scientific and practical values and determine whether it should be published or not. During peer review, editorial board members can also obtain cutting-edge information in that field at first hand. As leaders in their field, they have priority to be invited to write articles and publish commentary articles. We will put peer reviewers' names and affiliations along with the article they reviewed in the journal to acknowledge their contribution; (2) Maximization of the benefits of authors: Since *WJO* is an open-access journal, readers around the world can immediately download and read, free of charge, high-quality, peer-reviewed articles from *WJO* official website, thereby realizing the goals and significance of the communication between authors and peers as well as public reading; (3) Maximization of the benefits of readers: Readers can read or use, free of charge, high-quality peer-reviewed articles without any limits, and cite the arguments, viewpoints, concepts, theories, methods, results, conclusion or facts and data of pertinent literature so as to validate the innovativeness, scientific and practical values of their own research achievements, thus ensuring that their articles have novel arguments or viewpoints, solid evidence and correct conclusion; and (4) Maximization of the benefits of employees: It is an iron law that a first-class journal is unable to exist without first-class editors, and only first-class editors can create a first-class academic journal. We insist on strengthening our team cultivation and construction so that every employee, in an open, fair and transparent environment, could contribute their wisdom to edit and publish high-quality articles, thereby realizing the maximization of the personal benefits of editorial board members, authors and readers, and yielding the greatest social and economic benefits.

Aims and scope

The aim of *WJO* is to report rapidly new theories, methods and techniques for prevention, diagnosis, treatment, rehabilitation and nursing in the field of orthopedics. *WJO* covers diagnostic imaging, arthroscopy, evidence-based medicine, epidemiology, nursing, sports medicine, therapy of bone and spinal diseases, bone trauma, osteoarthropathy, bone tumors and osteoporosis, minimally invasive therapy, traditional medicine, and integrated Chinese and Western medicine. The journal also publishes original articles and reviews that report the results of applied and basic research in fields related to orthopedics, such as immunology, physiopathology, cell biology, pharmacology, medical genetics, and pharmacology of Chinese herbs.

Columns

The columns in the issues of *WJO* will include: (1) Editorial: To introduce and comment on major advances and developments in the field; (2) Frontier: To review representative achievements, comment on the state of current research, and propose directions for future research; (3) Topic Highlight: This column consists of three formats, including (A) 10 invited review articles on a hot topic, (B) a commentary on common issues of this hot topic, and (C) a commentary on the 10 individual articles; (4) Observation: To update the development of old and new questions, highlight unsolved problems, and provide strategies on how to solve the questions; (5) Guidelines for Basic Research: To provide Guidelines for basic research; (6) Guidelines for Clinical Practice: To provide guidelines for clinical diagnosis and treatment; (7) Review: To review systemically progress and unresolved problems in the field, comment on the state of current research, and make suggestions for future work; (8) Original Articles: To report innovative and original findings in orthopedics; (9) Brief Articles: To briefly report the novel and innovative findings in orthopedics; (10) Case Report: To report a rare or typical case; (11) Letters to the Editor: To discuss and make reply to the contributions published in *WJO*, or to introduce and comment on a controversial issue of general interest; (12) Book Reviews: To introduce and comment on quality monographs of orthopedics; and (13) Guidelines: To introduce consensuses and guidelines reached by international and national academic authorities worldwide on the research orthopedics.

Name of journal

World Journal of Orthopedics

SERIAL PUBLICATION NUMBER

ISSN 2218-5836 (online)

Published by

Baishideng Publishing Group Co., Limited

SPECIAL STATEMENT

All articles published in this journal represent the viewpoints of the authors except where indicated otherwise.

Biostatistical editing

Statisital review is performed after peer review. We invite an expert in Biomedical Statistics from to evaluate the statistical method used in the paper, including *t*-test (group or paired comparisons), chi-squared test, Ridit, probit, logit, regression (linear, curvilinear, or stepwise), correlation, analysis of variance, analysis of covariance, *etc*. The reviewing points include: (1) Statistical methods should be described when they are used to verify the results; (2) Whether the statistical techniques are suitable or correct; (3) Only homogeneous data can be averaged. Standard deviations are preferred to standard errors. Give the number of observations and subjects (*n*). Losses in observations, such as drop-outs from the study should be reported; (4) Values such as ED50, LD50, IC50 should have their 95% confidence limits calculated and compared by weighted probit analysis (Bliss and Finney); and (5) The word 'significantly' should be replaced by its synonyms (if it indicates extent) or the *P* value (if it indicates statistical significance).

Conflict-of-interest statement

In the interests of transparency and to help reviewers assess any potential bias, *WJO* requires authors of all papers to declare any competing commercial, personal, political, intellectual, or religious interests in relation to the submitted work. Referees are also asked to indicate any potential conflict they might have reviewing a particular paper. Before submitting, authors are suggested to read "Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Ethical Considerations in the Conduct and Reporting of Research: Conflicts of Interest" from International Committee of Medical Journal Editors (ICMJE), which is available at: http://www.icmje.org/ethical_4conflicts.html.

Sample wording: [Name of individual] has received fees for serving as a speaker, a consultant and an advisory board member for [names of organizations], and has received research funding from [names of organization]. [Name of individual] is an employee of [name of organization]. [Name of individual] owns stocks and shares in [name of organization]. [Name of individual] owns patent [patent identification and brief description].

Statement of informed consent

Manuscripts should contain a statement to the effect that all human studies have been reviewed by the appropriate ethics committee or it should be stated clearly in the text that all persons gave their informed consent prior to their inclusion in the study. Details that might disclose the identity of the subjects under study should be omitted. Authors should also draw attention to the Code of Ethics of the World Medical Association (Declaration of Helsinki, 1964, as revised in 2004).

Statement of human and animal rights

When reporting the results from experiments, authors should follow the highest standards and the trial should conform to Good Clinical Practice (for example, US Food and Drug Administration Good Clinical Practice in FDA-Regulated Clinical Trials; UK Medicines Research Council Guidelines for Good Clinical Practice in Clinical Trials) and/or the World Medical Association Declaration of Helsinki. Generally, we suggest authors follow the lead investigator's national standard. If doubt exists whether the research was conducted in accordance with the above standards, the authors must explain the rationale for their approach and demonstrate that the institutional review body explicitly approved the doubtful aspects of the study.

Before submitting, authors should make their study approved by the relevant research ethics committee or institutional review board. If human participants were involved, manuscripts must be accompanied by a statement that the experiments were undertaken with the understanding and appropriate informed consent of each. Any personal item or information will not be published without explicit consents from the involved patients. If experimental animals were used, the materials and methods (experimental procedures) section must clearly indicate that appropriate measures were taken to minimize pain or discomfort, and details of animal care should be provided.

SUBMISSION OF MANUSCRIPTS

Manuscripts should be typed in 1.5 line spacing and 12 pt. Book Antiqua with ample margins. Number all pages consecutively, and start each of the following sections on a new page: Title Page, Abstract, Introduction, Materials and Methods, Results, Discussion, Acknowledgements, References, Tables, Figures, and Figure Legends. Neither the editors nor the publisher are responsible for the opinions expressed by contributors. Manuscripts formally accepted for publication become the permanent property of Baishideng Publishing Group Co., Limited, and may not be reproduced by any means, in whole or in part, without the written permission of both the authors and the publisher. We reserve the right to copy-edit and put onto our website accepted manuscripts. Authors should follow the relevant guidelines for the care and use of laboratory animals of their institution or national animal welfare committee. For the sake of transparency in regard to the performance and reporting of clinical trials, we endorse the policy of the ICMJE to refuse to publish papers on clinical trial results if the trial was not recorded in a publicly-accessible registry at its outset. The only register now available, to our knowledge, is http://www.clinicaltrials.gov sponsored by the United States National Library of Medicine and we encourage all potential contributors to register with it. However, in the case that other registers become available you will be duly notified. A letter of recommendation from each author's organization should be provided with the contributed article to ensure the privacy and secrecy of research is protected.

Authors should retain one copy of the text, tables, photographs and illustrations because rejected manuscripts will not be returned to the author(s) and the editors will not be responsible for loss or damage to photographs and illustrations sustained during mailing.

Online submissions

Manuscripts should be submitted through the Online Submission System at: http://www.wjgnet.com/2218-5836office. Authors are highly recommended to consult the ONLINE INSTRUCTIONS TO AUTHORS (http://www.wjgnet.com/2218-5836/g_info_20100722172650.htm) before attempting to submit online. For assistance, authors encountering problems with the Online Submission System may send an email describing the problem to wjo@wjgnet.com, or by telephone: +86-10-85381892. If you submit your manuscript online, do not make a postal contribution. Repeated online submission for the same manuscript is strictly prohibited.

MANUSCRIPT PREPARATION

All contributions should be written in English. All articles must be submitted using word-processing software. All submissions must be typed in 1.5 line spacing and 12 pt. Book Antiqua with ample margins. Style should conform to our house format. Required information for each of the manuscript sections is as follows:

Title page

Title: Title should be less than 12 words.

Running title: A short running title of less than 6 words should be provided.

Authorship: Authorship credit should be in accordance with the standard proposed by International Committee of Medical Journal Editors, based on (1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; (2) drafting the article or revising it critically for important intellectual content; and (3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3.

Institution: Author names should be given first, then the complete name of institution, city, province and postcode. For example, Xu-Chen Zhang, Li-Xin Mei, Department of Pathology, Chengde Medical College, Chengde 067000, Hebei Province, China. One author may be represented from two institutions, for example, George Sgourakis, Department of General, Visceral, and Transplantation Surgery, Essen 45122, Germany; George Sgourakis, 2nd Surgical Department, Korgialenio-Benakio Red Cross Hospital, Athens 15451, Greece

Author contributions: The format of this section should be: Author contributions: Wang CL and Liang L contributed equally to this work; Wang CL, Liang L, Fu JF, Zou CC, Hong F and Wu XM designed the research; Wang CL, Zou CC, Hong F and Wu XM performed the research; Xue JZ and Lu JR contributed new reagents/analytic tools; Wang CL, Liang L and Fu JF analyzed the data; and Wang CL, Liang L and Fu JF wrote the paper.

Supportive foundations: The complete name and number of supportive foundations should be provided, e.g. Supported by National Natural Science Foundation of China, No. 30224801

Correspondence to: Only one corresponding address should be provided. Author names should be given first, then author title, affiliation, the complete name of institution, city, postcode, province, country, and email. All the letters in the email should be in lower case. A space interval should be inserted between country name and email address. For example, Montgomery Bissell, MD, Professor of Medicine, Chief, Liver Center, Gastroenterology Division, University of California, Box 0538, San Francisco, CA 94143, United States. montgomery.bissell@ucsf.edu

Telephone and fax: Telephone and fax should consist of +, country number, district number and telephone or fax number, e.g. Telephone: +86-10-59080039 Fax: +86-10-85381893

Peer reviewers: All articles received are subject to peer review. Normally, three experts are invited for each article. Decision for acceptance is made only when at least two experts recommend an article for publication. Reviewers for accepted manuscripts are acknowledged in each manuscript, and reviewers of articles which were not accepted will be acknowledged at the end of each issue. To ensure the quality of the articles published in *WJO*, reviewers of accepted manuscripts will be announced by publishing the name, title/position and institution of the reviewer in the footnote accompanying the printed article. For example, reviewers: Professor Jing-Yuan Fang, Shanghai Institute of Digestive Disease, Shanghai, Affiliated Renji Hospital, Medical Faculty, Shanghai Jiaotong University, Shanghai, China; Professor Xin-Wei Han, Department of Radiology, The First Affiliated Hospital, Zhengzhou University, Zhengzhou, Henan Province, China; and Professor Anren Kuang, Department of Nuclear Medicine, Huaxi Hospital, Sichuan University, Chengdu, Sichuan Province, China.

Abstract

There are unstructured abstracts (no more than 256 words) and structured abstracts (no more than 480). The specific requirements for structured abstracts are as follows:

An informative, structured abstracts of no more than 480 words should accompany each manuscript. Abstracts for original contributions should be structured into the following sections. AIM (no more than 20 words): Only the purpose should be included. Please write the aim as the form of "To investigate/study/…"; MATERIALS AND METHODS (no more than 140 words); RESULTS (no more than 294 words): You should present *P* values where appropriate and must provide relevant data to illustrate how they were obtained, e.g. 6.92 ± 3.86 *vs* 3.61 ± 1.67, $P < 0.001$; CONCLUSION (no more than 26 words).

Key words

Please list 5-10 key words, selected mainly from *Index Medicus*, which reflect the content of the study.

Text

For articles of these sections, original articles and brief articles, the main text should be structured into the following sections: INTRODUCTION, MATERIALS AND METHODS, RESULTS and DISCUSSION, and should include appropriate Figures and Tables. Data should be presented in the main text or in Figures and Tables, but not in both. The main text format of these sections, editorial, topic highlight, case report, letters to the editors, can be found at: http://www.wjgnet.com/2218-5836/g_info_list.htm.

Illustrations

Figures should be numbered as 1, 2, 3, *etc.*, and mentioned clearly in the main text. Provide a brief title for each figure on a separate page. Detailed legends should not be provided under the figures. This part should be added into the text where the figures are applicable. Figures should be either Photoshop or Illustrator files (in tiff, eps, jpeg formats) at high-resolution. Examples can be found at: http://www.wjgnet.com/1007-9327/13/4520.pdf; http://www.wjgnet.com/1007-9327/13/4554.pdf; http://www.wjgnet.com/1007-9327/13/4891.pdf; http://www.wjgnet.com/1007-9327/13/4986.pdf; http://www.wjgnet.com/1007-9327/13/4498.pdf. Keeping all elements compiled is necessary in line-art image. Scale bars should be used rather than magnification factors, with the length of the bar defined in the legend rather than on the bar itself. File names should identify the figure and panel. Avoid layering type directly over shaded or textured areas. Please use uniform legends for the same subjects. For example: Figure 1 Pathological changes in atrophic gastritis after treatment. A: ...; B: ...; C: ...; D: ...; E: ...; F: ...; G: …*etc.* It is our principle to publish high resolution-figures for the printed and E-versions.

Tables

Three-line tables should be numbered 1, 2, 3, *etc.*, and mentioned clearly in the main text. Provide a brief title for each table. Detailed legends should not be included under tables, but rather added into the text where applicable. The information should complement, but not duplicate the text. Use one horizontal line under the title, a second under column heads, and a third below the Table, above any footnotes. Vertical and italic lines should be omitted.

Notes in tables and illustrations

Data that are not statistically significant should not be noted. $^aP < 0.05$, $^bP < 0.01$ should be noted ($P > 0.05$ should not be noted). If there are other series of *P* values, $^cP < 0.05$ and $^dP < 0.01$ are used. A third series of *P* values can be expressed as $^eP < 0.05$ and $^fP < 0.01$. Other notes in tables or under illustrations should be expressed as ^1F, ^2F, ^3F; or sometimes as other symbols with a superscript (Arabic numerals) in the upper left corner. In a multi-curve illustration, each curve should be labeled with ●, ○, ■, □, ▲, △, *etc.*, in a certain sequence.

Acknowledgments

Brief acknowledgments of persons who have made genuine contributions to the manuscript and who endorse the data and conclusions should be included. Authors are responsible for obtaining written permission to use any copyrighted text and/or illustrations.

REFERENCES

Coding system

The author should number the references in Arabic numerals according to the citation order in the text. Put reference numbers in square brackets in superscript at the end of citation content or after the cited author's name. For citation content which is part of the narration, the coding number and square brackets should be typeset normally. For example, "Crohn's disease (CD) is associated with increased intestinal permeability[1,2]". If references are cited directly in the text, they should be put together within the text, for example, "From references[19,22-24], we know that...".

When the authors write the references, please ensure that the order in text is the same as in the references section, and also ensure the spelling accuracy of the first author's name. Do not list the same citation twice.

PMID and DOI

Pleased provide PubMed citation numbers to the reference list, e.g. PMID and DOI, which can be found at http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed and http://www.crossref.org/SimpleTextQuery/, respectively. The numbers will be used in E-version of this journal.

Style for journal references

Authors: the name of the first author should be typed in bold-faced letters. The family name of all authors should be typed with the initial letter capitalized, followed by their abbreviated first and middle initials. (For example, Lian-Sheng Ma is abbreviated as Ma LS, Bo-Rong Pan as Pan BR). The title of the cited article and italicized journal title (journal title should be in its abbreviated form as shown in PubMed), publication date, volume number (in black), start page, and end page [PMID: 11819634 DOI: 10.3748/wjg.13.5396].

Style for book references

Authors: the name of the first author should be typed in bold-faced letters. The surname of all authors should be typed with the initial letter capitalized, followed by their abbreviated middle and first initials. (For example, Lian-Sheng Ma is abbreviated as Ma LS, Bo-Rong Pan as Pan BR) Book title. Publication number. Publication place: Publication press, Year: start page and end page.

Format

Journals

English journal article (list all authors and include the PMID where applicable)

1 **Jung EM**, Clevert DA, Schreyer AG, Schmitt S, Rennert J, Kubale R, Feuerbach S, Jung F. Evaluation of quantitative contrast harmonic imaging to assess malignancy of liver tumors: A prospective controlled two-center study. *World J Gastroenterol* 2007; **13**: 6356-6364 [PMID: 18081224 DOI: 10.3748/wjg.13.6356]

Chinese journal article (list all authors and include the PMID where applicable)

2 **Lin GZ**, Wang XZ, Wang P, Lin J, Yang FD. Immunologic effect of Jianpi Yishen decoction in treatment of Pixu-diarrhoea. *Shijie Huaren Xiaohua Zazhi* 1999; **7**: 285-287

In press

3 **Tian D**, Araki H, Stahl E, Bergelson J, Kreitman M. Signature of balancing selection in Arabidopsis. *Proc Natl Acad Sci USA* 2006; In press

Organization as author

4 **Diabetes Prevention Program Research Group**. Hypertension, insulin, and proinsulin in participants with impaired glucose tolerance. *Hypertension* 2002; **40**: 679-686 [PMID: 12411462 PMCID:2516377 DOI:10.1161/01.HYP.0000035706.28494.09]

Both personal authors and an organization as author

5 **Vallancien G**, Emberton M, Harving N, van Moorselaar RJ; Alf-One Study Group. Sexual dysfunction in 1, 274 European men suffering from lower urinary tract symptoms. *J Urol* 2003; **169**: 2257-2261 [PMID: 12771764 DOI:10.1097/01.ju.0000067940.76090.73]

No author given

6 21st century heart solution may have a sting in the tail. *BMJ* 2002; **325**: 184 [PMID: 12142303 DOI:10.1136/bmj.325.7357.184]

Volume with supplement

7 **Geraud G**, Spierings EL, Keywood C. Tolerability and safety of frovatriptan with short- and long-term use for treatment of migraine and in comparison with sumatriptan. *Headache* 2002; **42** Suppl 2: S93-99 [PMID: 12028325 DOI:10.1046/j.1526-4610.42.s2.7.x]

Issue with no volume

8 **Banit DM**, Kaufer H, Hartford JM. Intraoperative frozen section analysis in revision total joint arthroplasty. *Clin Orthop Relat Res* 2002; (**401**): 230-238 [PMID: 12151900 DOI:10.1097/00003086-200208000-00026]

No volume or issue

9 Outreach: Bringing HIV-positive individuals into care. *HRSA Careaction* 2002; 1-6 [PMID: 12154804]

Books

Personal author(s)

10 **Sherlock S**, Dooley J. Diseases of the liver and billiary system. 9th ed. Oxford: Blackwell Sci Pub, 1993: 258-296

Chapter in a book (list all authors)

11 **Lam SK**. Academic investigator's perspectives of medical treatment for peptic ulcer. In: Swabb EA, Azabo S. Ulcer disease: investigation and basis for therapy. New York: Marcel Dekker, 1991: 431-450

Author(s) and editor(s)

12 **Breedlove GK**, Schorfheide AM. Adolescent pregnancy. 2nd ed. Wieczorek RR, editor. White Plains (NY): March of Dimes Education Services, 2001: 20-34

Conference proceedings

13 **Harnden P**, Joffe JK, Jones WG, editors. Germ cell tumours V. Proceedings of the 5th Germ cell tumours Conference; 2001 Sep 13-15; Leeds, UK. New York: Springer, 2002: 30-56

Conference paper

14 **Christensen S**, Oppacher F. An analysis of Koza's computational effort statistic for genetic programming. In: Foster JA, Lutton E, Miller J, Ryan C, Tettamanzi AG, editors. Genetic programming. EuroGP 2002: Proceedings of the 5th European Conference on Genetic Programming; 2002 Apr 3-5; Kinsdale, Ireland. Berlin: Springer, 2002: 182-191

Electronic journal (list all authors)

15 Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis serial online, 1995-01-03, cited 1996-06-05; 1(1): 24 screens. Available from: URL: http://www.cdc.gov/ncidod/eid/index.htm

Patent (list all authors)

16 **Pagedas AC**, inventor; Ancel Surgical R&D Inc., assignee. Flexible endoscopic grasping and cutting device and positioning tool assembly. United States patent US 20020103498. 2002 Aug 1

Statistical data

Write as mean ± SD or mean ± SE.

Statistical expression

Express t test as t (in italics), F test as F (in italics), chi square test as χ^2 (in Greek), related coefficient as r (in italics), degree of freedom as υ (in Greek), sample number as n (in italics), and probability as P (in italics).

Units

Use SI units. For example: body mass, m (B) = 78 kg; blood pressure, p (B) = 16.2/12.3 kPa; incubation time, t (incubation) = 96 h, blood glucose concentration, c (glucose) 6.4 ± 2.1 mmol/L; blood CEA mass concentration, p (CEA) = 8.6 24.5 μg/L; CO_2 volume fraction, 50 mL/L CO_2, not 5% CO_2; likewise for 40 g/L formaldehyde, not 10% formalin; and mass fraction, 8 ng/g, *etc*. Arabic numerals such as 23, 243, 641 should be read 23 243 641.

The format for how to accurately write common units and quantums can be found at: http://www.wjgnet.com/2218-5836/g_info_20100724204625.htm.

Abbreviations

Standard abbreviations should be defined in the abstract and on first mention in the text. In general, terms should not be abbreviated unless they are used repeatedly and the abbreviation is helpful to the reader. Permissible abbreviations are listed in Units, Symbols and Abbreviations: A Guide for Biological and Medical Editors and Authors (Ed. Baron DN, 1988) published by The Royal Society of Medicine, London. Certain commonly used abbreviations, such as DNA, RNA, HIV, LD50, PCR, HBV, ECG, WBC, RBC, CT, ESR, CSF, IgG, ELISA, PBS, ATP, EDTA, mAb, can be used directly without further explanation.

Italics

Quantities: *t* time or temperature, *c* concentration, *A* area, *l* length, *m* mass, *V* volume.
Genotypes: *gyrA*, *arg* 1, *c myc*, *c fos*, *etc.*
Restriction enzymes: *Eco*RI, *Hin*dI, *Bam*HI, *Kbo* I, *Kpn* I, *etc.*
Biology: *H. pylori*, *E coli*, *etc.*

Examples for paper writing

Editorial: http://www.wjgnet.com/2218-5836/g_info_20100723140942.htm

Frontier: http://www.wjgnet.com/2218-5836/g_info_20100723141035.htm

Topic highlight: http://www.wjgnet.com/2218-5836/g_info_20100723141239.htm

Observation: http://www.wjgnet.com/2218-5836/g_info_20100723141532.htm

Guidelines for basic research: http://www.wjgnet.com/2218-5836/g_info_20100723142040.htm

Guidelines for clinical practice: http://www.wjgnet.com/2218-5836/g_info_20100723142248.htm

Review: http://www.wjgnet.com/2218-5836/g_info_20100723145519.htm

Original articles: http://www.wjgnet.com/2218-5836/g_info_20100723145856.htm

Brief articles: http://www.wjgnet.com/2218-5836/g_info_20100723150253.htm

Case report: http://www.wjgnet.com/2218-5836/g_info_20100723150420.htm

Letters to the editor: http://www.wjgnet.com/2218-5836/g_info_20100723150642.htm

Book reviews: http://www.wjgnet.com/2218-5836/g_info_20100723150839.htm

Guidelines: http://www.wjgnet.com/2218-5836/g_info_20100723150924.htm

SUBMISSION OF THE REVISED MANUSCRIPTS AFTER ACCEPTED

Please revise your article according to the revision policies of *WJO*. The revised version including manuscript and high-resolution image figures (if any) should be copied on a floppy or compact disk. The author should send the revised manuscript, along with printed high-resolution color or black and white photos, copyright transfer letter, and responses to the reviewers by courier (such as EMS/DHL).

Editorial Office

World Journal of Orthopedics
Editorial Department: Room 903, Building D,
Ocean International Center,
No. 62 Dongsihuan Zhonglu,
Chaoyang District, Beijing 100025, China
E-mail: wjo@wjgnet.com
http://www.wjgnet.com
Telephone: +86-10-59081630
Fax: +86-10-85381893

Language evaluation

The language of a manuscript will be graded before it is sent for revision. (1) Grade A: priority publishing; (2) Grade B: minor language polishing; (3) Grade C: a great deal of language polishing needed; and (4) Grade D: rejected. Revised articles should reach Grade A or B.

Copyright assignment form

Please download a Copyright assignment form from http://www.wjgnet.com/2218-5836/g_info_20100724204516.htm.

Responses to reviewers

Please revise your article according to the comments/suggestions provided by the reviewers. The format for responses to the reviewers' comments can be found at: http://www.wjgnet.com/2218-5836/g_info_20100724204306.htm.

Proof of financial support

For paper supported by a foundation, authors should provide a copy of the document and serial number of the foundation.

Links to documents related to the manuscript

WJO will be initiating a platform to promote dynamic interactions between the editors, peer reviewers, readers and authors. After a manuscript is published online, links to the PDF version of the submitted manuscript, the peer-reviewers' report and the revised manuscript will be put on-line. Readers can make comments on the peer reviewer's report, authors' responses to peer reviewers, and the revised manuscript. We hope that authors will benefit from this feedback and be able to revise the manuscript accordingly in a timely manner.

Science news releases

Authors of accepted manuscripts are suggested to write a science news item to promote their articles. The news will be released rapidly at EurekAlert/AAAS (http://www.eurekalert.org). The title for news items should be less than 90 characters; the summary should be less than 75 words; and main body less than 500 words. Science news items should be lawful, ethical, and strictly based on your original content with an attractive title and interesting pictures.

Publication fee

WJO is an international, peer-reviewed, Open-Access, online journal. Articles published by this journal are distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited, the use is non commercial and is otherwise in compliance with the license. Authors of accepted articles must pay a publication fee. The related standards are as follows. Publication fee: 1300 USD per article. Editorial, topic highlights, book reviews and letters to the editor are published free of charge.