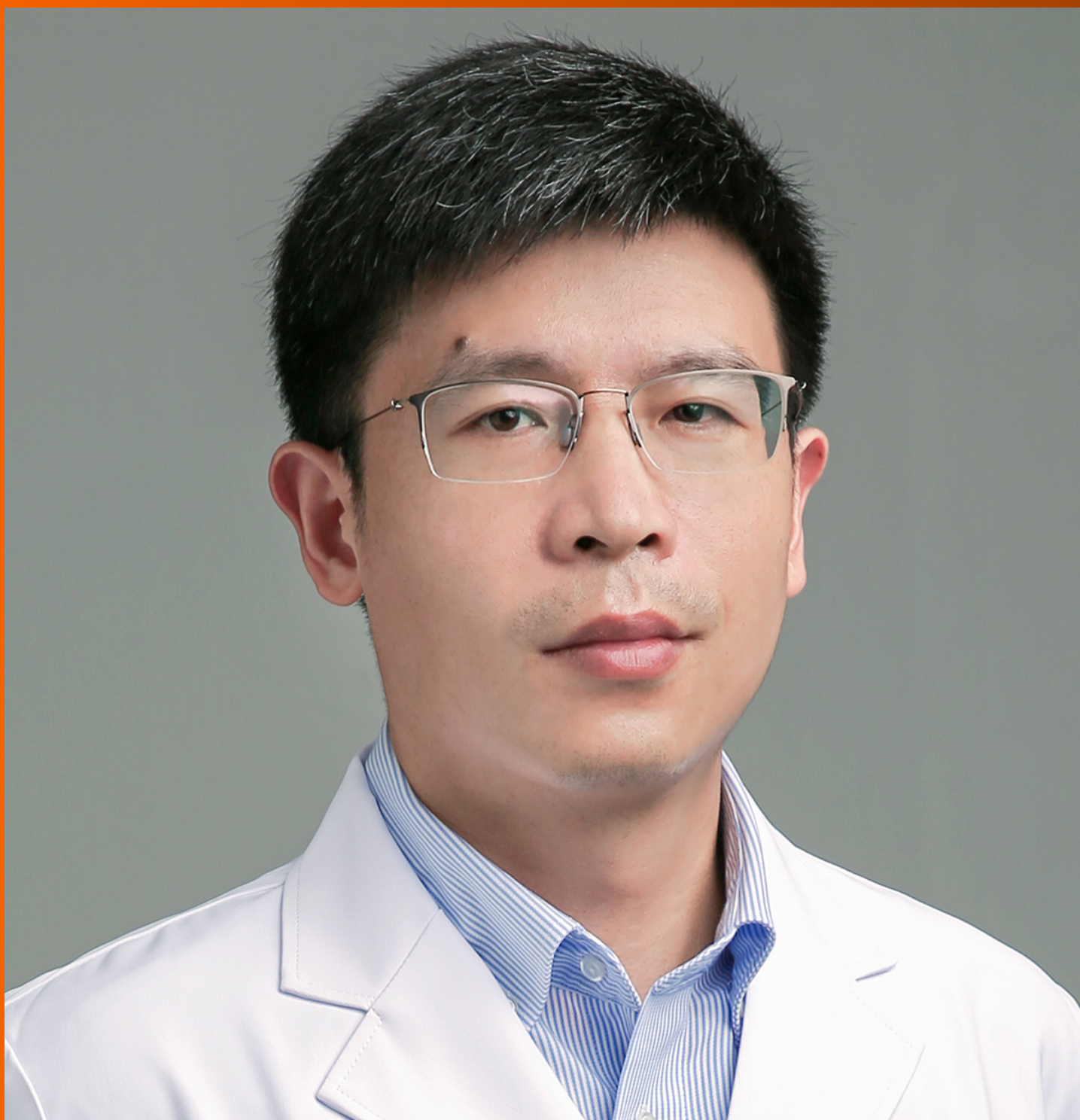


# World Journal of *Clinical Cases*

*World J Clin Cases* 2022 May 6; 10(13): 3969-4326



## Contents

Thrice Monthly Volume 10 Number 13 May 6, 2022

## REVIEW

- 3969 COVID-19 and liver diseases, what we know so far  
*Elnaggar M, Abomhaya A, Elkhattib I, Dawoud N, Doshi R*

## MINIREVIEWS

- 3981 Amputation stump management: A narrative review  
*Choo YJ, Kim DH, Chang MC*

## ORIGINAL ARTICLE

## Clinical and Translational Research

- 3989 Solute carrier family 2 members 1 and 2 as prognostic biomarkers in hepatocellular carcinoma associated with immune infiltration  
*Peng Q, Hao LY, Guo YL, Zhang ZQ, Ji JM, Xue Y, Liu YW, Lu JL, Li CG, Shi XL*

## Retrospective Cohort Study

- 4020 Role of clinical data and multidetector computed tomography findings in acute superior mesenteric artery embolism  
*Yang JS, Xu ZY, Chen FX, Wang MR, Cong RC, Fan XL, He BS, Xing W*

## Retrospective Study

- 4033 Effect of calcium supplementation on severe hypocalcemia in patients with secondary hyperparathyroidism after total parathyroidectomy  
*Liu J, Fan XF, Yang M, Huang LP, Zhang L*
- 4042 Comparison of clinical efficacy and postoperative inflammatory response between laparoscopic and open radical resection of colorectal cancer  
*He LH, Yang B, Su XQ, Zhou Y, Zhang Z*
- 4050 Three-dimensional echocardiographic assessment of left ventricular volume in different heart diseases using a fully automated quantification software  
*Pan CK, Zhao BW, Zhang XX, Pan M, Mao YK, Yang Y*
- 4064 Clinical effect of ultrasound-guided nerve block and dexmedetomidine anesthesia on lower extremity operative fracture reduction  
*Ao CB, Wu PL, Shao L, Yu JY, Wu WG*
- 4072 Correlation between thrombopoietin and inflammatory factors, platelet indices, and thrombosis in patients with sepsis: A retrospective study  
*Xu WH, Mo LC, Shi MH, Rao H, Zhan XY, Yang M*

**Observational Study**

- 4084** High plasma CD40 ligand level is associated with more advanced stages and worse prognosis in colorectal cancer

*Herold Z, Herold M, Herczeg G, Fodor A, Szasz AM, Dank M, Somogyi A*

- 4097** Metabolic dysfunction is associated with steatosis but no other histologic features in nonalcoholic fatty liver disease

*Dai YN, Xu CF, Pan HY, Huang HJ, Chen MJ, Li YM, Yu CH*

**Randomized Controlled Trial**

- 4110** Effect of Xuebijing injection on myocardium during cardiopulmonary bypass: A prospective, randomized, double blind trial

*Jin ZH, Zhao XQ, Sun HB, Zhu JL, Gao W*

**META-ANALYSIS**

- 4119** Perioperative respiratory muscle training improves respiratory muscle strength and physical activity of patients receiving lung surgery: A meta-analysis

*Yang MX, Wang J, Zhang X, Luo ZR, Yu PM*

**CASE REPORT**

- 4131** Delayed diffuse lamellar keratitis after small-incision lenticule extraction related to immunoglobulin A nephropathy: A case report

*Dan TT, Liu TX, Liao YL, Li ZZ*

- 4137** Large vessel vasculitis with rare presentation of acute rhabdomyolysis: A case report and review of literature

*Fu LJ, Hu SC, Zhang W, Ye LQ, Chen HB, Xiang XJ*

- 4145** Primitive neuroectodermal tumor of the prostate in a 58-year-old man: A case report

*Tian DW, Wang XC, Zhang H, Tan Y*

- 4153** Bilateral superficial cervical plexus block for parathyroidectomy during pregnancy: A case report

*Chung JY, Lee YS, Pyeon SY, Han SA, Huh H*

- 4161** Primary myelofibrosis with thrombophilia as first symptom combined with thalassemia and Gilbert syndrome: A case report

*Wufuer G, Wufuer K, Ba T, Cui T, Tao L, Fu L, Mao M, Duan MH*

- 4171** Late contralateral recurrence of retinal detachment in incontinentia pigmenti: A case report

*Cai YR, Liang Y, Zhong X*

- 4177** Pregnancy and delivery after augmentation cystoplasty: A case report and review of literature

*Ruan J, Zhang L, Duan MF, Luo DY*

- 4185** Acute pancreatitis as a rare complication of gastrointestinal endoscopy: A case report

*Dai MG, Li LF, Cheng HY, Wang JB, Ye B, He FY*

- 4190** Paraneoplastic neurological syndrome with positive anti-Hu and anti-Yo antibodies: A case report  
*Li ZC, Cai HB, Fan ZZ, Zhai XB, Ge ZM*
- 4196** Primary pulmonary meningioma: A case report and review of the literature  
*Zhang DB, Chen T*
- 4207** Anesthesia of a patient with congenital cataract, facial dysmorphism, and neuropathy syndrome for posterior scoliosis: A case report  
*Hudec J, Kosinova M, Prokopova T, Filipovic M, Repko M, Stourac P*
- 4214** Extensive myocardial calcification in critically ill patients receiving extracorporeal membrane oxygenation: A case report  
*Sui ML, Wu CJ, Yang YD, Xia DM, Xu TJ, Tang WB*
- 4220** Trigeminal extracranial thermocoagulation along with patient-controlled analgesia with esketamine for refractory postherpetic neuralgia after herpes zoster ophthalmicus: A case report  
*Tao JC, Huang B, Luo G, Zhang ZQ, Xin BY, Yao M*
- 4226** Thrombotic pulmonary embolism of inferior vena cava during caesarean section: A case report and review of the literature  
*Jiang L, Liang WX, Yan Y, Wang SP, Dai L, Chen DJ*
- 4236** EchoNavigator virtual marker and Agilis NxT steerable introducer facilitate transseptal transcatheter closure of mitral paravalvular leak  
*Hsu JC, Khoi CS, Huang SH, Chang YY, Chen SL, Wu YW*
- 4242** Primary isolated central nervous system acute lymphoblastic leukemia with *BCR-ABL1* rearrangement: A case report  
*Chen Y, Lu QY, Lu JY, Hong XL*
- 4249** Coexistence of meningioma and other intracranial benign tumors in non-neurofibromatosis type 2 patients: A case report and review of literature  
*Hu TH, Wang R, Wang HY, Song YF, Yu JH, Wang ZX, Duan YZ, Liu T, Han S*
- 4264** Treatment of condylar osteophyte in temporomandibular joint osteoarthritis with muscle balance occlusal splint and long-term follow-up: A case report  
*Lan KW, Chen JM, Jiang LL, Feng YF, Yan Y*
- 4273** Hepatic perivascular epithelioid cell tumor: A case report  
*Li YF, Wang L, Xie YJ*
- 4280** Multiple stress fractures of unilateral femur: A case report  
*Tang MT, Liu CF, Liu JL, Saijilafu, Wang Z*
- 4288** Enigmatic rapid organization of subdural hematoma in a patient with epilepsy: A case report  
*Lv HT, Zhang LY, Wang XT*

- 4294** Spinal canal decompression for hypertrophic neuropathy of the cauda equina with chronic inflammatory demyelinating polyradiculoneuropathy: A case report  
*Ye L, Yu W, Liang NZ, Sun Y, Duan LF*
- 4301** Primary intracranial extraskeletal myxoid chondrosarcoma: A case report and review of literature  
*Zhu ZY, Wang YB, Li HY, Wu XM*
- 4314** Mass brain tissue lost after decompressive craniectomy: A case report  
*Li GG, Zhang ZQ, Mi YH*

**LETTER TO THE EDITOR**

- 4321** Improving outcomes in geriatric surgery: Is there more to the equation?  
*Goh SSN, Chia CL*
- 4324** Capillary leak syndrome: A rare cause of acute respiratory distress syndrome  
*Juneja D, Kataria S*

**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Kai Zhang, PhD, Professor, Department of Psychiatry, Chaohu Hospital of Anhui Medical University, Hefei 238000, Anhui Province, China. zhangkai@ahmu.edu.cn

**AIMS AND SCOPE**

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

**INDEXING/ABSTRACTING**

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for WJCC as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Xu Guo; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

May 6, 2022

**COPYRIGHT**

© 2022 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/GerInfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



Retrospective Study

# Clinical effect of ultrasound-guided nerve block and dexmedetomidine anesthesia on lower extremity operative fracture reduction

Cheng-Bin Ao, Ping-Lei Wu, Liang Shao, Jian-Ying Yu, Wei-Guo Wu

**Specialty type:** Anesthesiology

**Provenance and peer review:**

Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0

Grade B (Very good): B

Grade C (Good): C

Grade D (Fair): 0

Grade E (Poor): 0

**P-Reviewer:** Fichtner A, Germany; Hjuler KF, Denmark

**Received:** December 27, 2021

**Peer-review started:** December 27, 2021

**First decision:** January 25, 2022

**Revised:** February 17, 2022

**Accepted:** March 15, 2022

**Article in press:** March 15, 2022

**Published online:** May 6, 2022



**Cheng-Bin Ao, Ping-Lei Wu, Liang Shao, Jian-Ying Yu,** Department of Anesthesiology, The People's Hospital of Yuhuan, Taizhou 317600, Zhejiang Province, China

**Wei-Guo Wu,** Department of Orthopedics, Taizhou Luqiao Second People's Hospital, Taizhou 318000, Zhejiang Province, China

**Corresponding author:** Wei-Guo Wu, BMed, Associate Chief Physician, Department of Orthopedics, Taizhou Luqiao Second People's Hospital, No. 500 Industrial Road, Jinqing Town, Luqiao District, Taizhou 318000, Zhejiang Province, China. [wu4628554@163.com](mailto:wu4628554@163.com)

## Abstract

### BACKGROUND

Lower extremity fractures are mainly treated by surgical reduction, but this operation is often affected by the patient's level of agitation and the type of anesthesia used. The main treatment for lower-extremity fractures is operative reduction. However, operations can often be affected by both agitation and the degree of anesthesia. Therefore, it is of great importance to develop an effective anesthesia program to effectively ensure the progress of surgery.

### AIM

To discuss the effect of ultrasound-guided nerve block combined with dexmedetomidine anesthesia in lower extremity fracture surgery.

### METHODS

A total of 120 hospital patients with lower extremity fractures were selected for this retrospective study and divided into an observation group ( $n = 60$ ) and a control group ( $n = 60$ ) according to the anesthesia scheme; the control group received ultrasound-guided nerve block; the observation group was treated with dexmedetomidine on the basis of the control group, and the mean arterial pressure, heart rate (HR), and blood oxygen saturation were observed in the two groups.

### RESULTS

The mean arterial pressure of T1, T2 and T3 in the observation group were  $94.40 \pm 7.10$ ,  $90.84 \pm 7.21$  and  $91.03 \pm 6.84$  mmHg, significantly higher than that of the control group ( $P < 0.05$ ). The observation group's HR at T1 was  $76.60 \pm 7.52$

times/min, significantly lower than that of the control group ( $P < 0.05$ ); The observation group's HR at T2 and T3 was  $75.40 \pm 8.03$  times/min and  $76.64 \pm 7.11$  times/min, significantly higher than that of the control group ( $P < 0.05$ ). The observation group's visual analog score at 2 h, 6 h and 12 h after operation was  $3.55 \pm 0.87$ ,  $2.84 \pm 0.65$  and  $2.05 \pm 0.40$ . the recovery time was  $15.51 \pm 4.21$  min, significantly lower than that of the control group ( $P < 0.05$ ). Six hours post-anesthesia, epinephrine and norepinephrine in the observation group were  $81.10 \pm 21.19$  pg/mL and  $510.20 \pm 98.27$  pg/mL, significantly lower than that of the control group ( $P < 0.05$ ), and the mini-mental state exam score of the observation group was  $25.51 \pm 1.15$ , significantly higher than that in the control group ( $P < 0.05$ ).

### CONCLUSION

Ultrasound-guided nerve block combined with dexmedetomidine has a good anesthetic effect in the operation of lower limb fractures and has little effect on the hemodynamics of patients.

**Key Words:** Ultrasound; Nerve block; Dexmedetomidine; Lower extremity fracture; Anesthesia effect

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** Ultrasound-guided nerve block is the main anesthetic method for surgical bone fracture reduction. This study found that the ultrasound-guided nerve block combined with dexmedetomidine has a good anesthetic effect during the operative reduction of lower limb fractures and has little effect on the hemodynamics of patients.

**Citation:** Ao CB, Wu PL, Shao L, Yu JY, Wu WG. Clinical effect of ultrasound-guided nerve block and dexmedetomidine anesthesia on lower extremity operative fracture reduction. *World J Clin Cases* 2022; 10(13): 4064-4071

**URL:** <https://www.wjgnet.com/2307-8960/full/v10/i13/4064.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v10.i13.4064>

## INTRODUCTION

Due to increased age and loss of bone elements, the middle-aged and elderly have a higher probability of bone fracture. This is especially true for lower extremity fractures, which have become common and have a considerable effect on quality of life of patients[1,2]. The main treatment for lower-extremity fractures is operative reduction. However, operations can often be affected by both agitation and the degree of anesthesia. Therefore, it is of great importance to develop an effective anesthesia program to effectively ensure the progress of surgery[3].

Ultrasound-guided nerve block is the main anesthetic method for surgical bone fracture reduction. Ultrasound guidance can clarify the paths of puncture tip and drug diffusion more clearly, which not only ensures anesthesia effect, but also helps to avoid unnecessary injury[4,5]. However, according to previous studies[6,7], nerve block anesthesia may lead to an incomplete block; therefore, it is often combined with additional anesthetic drugs to improve the anesthetic effect. Dexmedetomidine is a clinically effective sedative and analgesic narcotic that exerts anesthetic effects by inhibiting  $\alpha_2$  adrenergic receptors through antisympathetic action. However, there are few clinical studies on the combined application of ultrasound-guided nerve block and dexmedetomidine, and further analysis is needed[8-10]. In our study, ultrasound-guided nerve block was used in combination with dexmedetomidine to explore the possibility of improved anesthetic effects in lower extremity fracture surgery.

## MATERIALS AND METHODS

### Baseline data

A total of 120 patients admitted to our hospital with lower extremity fractures from January 2017 to December 2019 were selected. The inclusion criteria were as follows: (1) patients with unilateral lower extremity fracture; (2) patients  $\geq 18$  years of age; and (3) patients with fully intact clinical data. The exclusion criteria were as follows: (1) patients with abnormal coagulation function, endocrine diseases, and other conditions affecting hemodynamics; and (2) pathological fracture accompanied by osteoporosis. Patients were divided into an observation group ( $n = 60$ ) and a control group ( $n = 60$ ). A

comparison of baseline data between the two groups is shown in [Table 1](#).

### **Anesthesia methods**

The control group received an ultrasound-guided nerve block. All patients were placed in the supine position, the intermuscular position was marked, the ultrasonic probe was coated with a coupling agent, and the frequency was set at 10 Hz. The scan depth after disinfection was controlled according to the actual situation of the patient, and the lower extremity nerves were pierced with a puncture needle and injected with anesthetic. Ropivacaine suspension (0.4%) was injected intravenously with a total dose of 25 mL, at a concentration of 0.361%, until lower limb nerve was completely covered by anesthetic.

The observation group was treated with dexmedetomidine based on the control group. Dexmedetomidine (Jiangsu Hausen Pharmaceutical Co., LTD., National drug approval H20120312) was intravenously pumped at a constant speed of 0.7 µg/mL, and the anesthetic was stopped 10 min before the operation.

### **Inspection methods**

A surgical life monitor was used to observe the heart rate (HR), mean arterial pressure (MAP), and blood oxygen saturation (SpO<sub>2</sub>) in the T1, T2, and T3 segments of the two groups, and the operation time, postoperative recovery time, complications, and visual analog score (VAS) score were recorded. Serum norepinephrine and epinephrine levels were detected using enzyme-linked immunoassay.

VAS scoring criteria was as follows: 0-1 for painless pain, 2-3 for mild pain, 4-6 for moderate pain, and 7-10 for severe pain[11].

Mini mental state examination (MMSE) scores were as follows[12,13]: The highest score was 30, the score between 27 and 30 was normal, and < 27 was cognitive dysfunction. Dementia severity grading method considered 21 points to be mild MMSE, 10-20 points as moderate MMSE, and less than or equal to 9 points as severe MMSE.

### **Statistical analysis**

The software SPSS (V22.0, IBM Corporation, Armonk, NY, USA) was adopted. A *t*-test or  $\chi^2$  test was used to analyze the differences of indexes between groups. The inspection level was bilateral  $\alpha = 0.05$ .

## **RESULTS**

### **Comparisons of MAP, HR and SpO<sub>2</sub>**

The MAP of T1, T2, and T3 in the observation group was significantly higher than that in the control group ( $P < 0.05$ ), and the HR at T1 of the observation group was significantly lower than that of the control group ( $P < 0.05$ ), and the HR at T2 and T3 in the observation group was significantly higher than that in the control group ( $P < 0.05$ ) ([Table 2](#)).

### **Comparison of VAS score**

The VAS score of the observation group at 2 h, 6 h and 12 h after operation was significantly lower than in the control group ( $P < 0.05$ ) ([Table 3](#)).

### **Comparison of epinephrine and norepinephrine before and after operation between the two groups**

Six hours after anesthesia, epinephrine and norepinephrine levels in the observation and control groups were significantly lower than those before the operation ( $P < 0.05$ ), and epinephrine and norepinephrine levels in the observation group were significantly lower than those in the control group ( $P < 0.05$ ). These results are shown in [Table 4](#).

### **Comparison of operation time and postoperative recovery time between the two groups**

The postoperative recovery time in the observation group was significantly lower than that in the control group ( $P < 0.05$ , [Table 5](#)).

### **Comparison of cognitive function between preoperative and postoperative**

One day after operation, the MMSE scores in the observation group and the control group were lower than those before operation. The MMSE score in the observation group was significantly higher than that in the control group ( $P < 0.05$ , [Table 6](#)).

### **Comparison of complications between the two groups**

There was no significant difference in the incidence of complications between the observation and control groups ( $P > 0.05$ , [Table 7](#)).

Table 1 Comparison of baseline data between the two groups, *n* (%)

Group	Cases	Male	Age (yr)	Body mass index (kg/m <sup>2</sup> )	ASA		Fracture type		
					I	II	Femoral neck	Tibiofibula	Intertrochanteric femoral
Observation group	60	36 (60.00)	57.64 ± 11.35	22.7 ± 3.11	40 (66.67)	20 (33.33)	20 (33.33)	24 (40.00)	16 (26.67)
Control group	60	42 (70.00)	58.80 ± 12.20	23.0 ± 2.95	38 (63.33)	22 (36.67)	18 (30.00)	26 (43.33)	16 (26.67)
<i>t</i> / $\chi^2$ value		1.319	-0.539	-0.470	0.147		0.185		
<i>P</i> value		0.251	0.591	0.639	0.702		0.912		

ASA: American Society of Anesthesiologists.

Table 2 Comparison of mean arterial pressure, heart rate and blood oxygen saturation in different time periods between the two groups

Index	Cases	T0	T1	T2	T3	T4
MAP (mmHg)						
Observation group	60	92.54 ± 8.11	94.40 ± 7.10	90.84 ± 7.21	91.03 ± 6.84	90.42 ± 7.12
Control group	60	93.01 ± 7.80	86.45 ± 6.58	82.30 ± 7.15	83.39 ± 6.84	90.05 ± 6.10
<i>t</i> value		-0.324	6.361	6.515	6.118	0.306
<i>P</i> value		0.747	0.000	0.000	0.000	0.760
HR (times/min)						
Observation group	60	82.21 ± 3.82	76.60 ± 7.52	75.40 ± 8.03	76.64 ± 7.11	81.21 ± 6.64
Control group	60	82.05 ± 3.95	88.15 ± 6.94	71.03 ± 7.22	70.45 ± 6.20	83.35 ± 7.10
<i>t</i> value		0.226	-8.743	3.135	5.083	-1.705
<i>P</i> value		0.822	0.000	0.002	0.000	0.091
SpO <sub>2</sub> (%)						
Observation group	60	97.78 ± 1.22	97.87 ± 1.12	97.68 ± 1.20	98.00 ± 1.12	98.11 ± 1.14
Control group	60	97.03 ± 1.35	97.70 ± 1.10	97.79 ± 1.23	97.76 ± 1.22	98.03 ± 1.18
<i>t</i> value		3.193	0.839	-0.496	1.123	0.378
<i>P</i> value		0.002	0.403	0.621	0.264	0.706

MAP: Mean arterial pressure; HR: Heart rate; SpO<sub>2</sub>: Blood oxygen saturation.

## DISCUSSION

Due to loss of calcium and reduced flexibility, gerontal patients have an increasing morbidity of lower extremity fracture resulting from various events such as falls and traffic accidents each year. After operative fracture reductions, these patients require a long-term bed. Because of the decreased inability to care for themselves along with the stress response to the fracture, patients often experience anxiety, depression, and other emotional reactions, with some patients even developing sleep disorders that have a considerable impact on the recovery and prognosis of patients[14].

Ropivacaine[15] is an amide anesthetic drug, with a clinical use of nerve block anesthesia. It inhibits sodium ion conduction from nerve cells, and blocks the conduction of nerve excitation and pain sensation, causing long-term block effects[16,17]. The sciatic and lumbar plexus nerves can be clearly displayed using ultrasound guidance, thus improving the success rate of the needle puncture and nerve block, reducing the stimulation to the body, preventing damage to important blood vessels and organs, and maintaining the stability of hemodynamics. However, according to some studies[18,19], ropivacaine has drawbacks such as incomplete block and slow onset of anesthesia, and thus needs to be combined with other anesthesia drugs when applied after clinical anesthesia. Dexmedetomidine is an  $\alpha_2$  receptor agonist and has been widely used in clinical application of regional block assisted sedation with high selectivity. The literature suggests that dexmedetomidine assisted anesthesia is more effective in

**Table 3 Comparison of visual analog score between the two groups**

Groups	Cases	VAS scores (points)			
		2 h after surgery	6 h after surgery	12 h after surgery	24 h after surgery
Observation group	60	3.55 ± 0.87	2.84 ± 0.65	2.05 ± 0.40	1.87 ± 0.33
Control group	60	5.84 ± 1.00	3.40 ± 0.70	2.66 ± 0.38	2.00 ± 0.41
<i>t</i> value		-13.383	-4.541	-8.564	-1.913
<i>P</i> value		0.000	0.000	0.000	0.058

VAS: Visual analog score.

**Table 4 Comparison of adrenaline and Noradrenaline before and after operation between the two groups**

Groups	Cases	Adrenaline (pg/ml)		Noradrenaline (pg/ml)	
		Preoperative	6 h after anesthesia	Preoperative	6 h after anesthesia
Observation group	60	104.43 ± 32.21	81.10 ± 21.19 <sup>a</sup>	630.12 ± 102.23	510.20 ± 98.27 <sup>a</sup>
Control group	60	108.29 ± 30.11	92.11 ± 15.53 <sup>a</sup>	634.49 ± 101.12	572.21 ± 91.54 <sup>a</sup>
<i>t</i> value		-0.678	-3.246	-0.235	-3.577
<i>P</i> value		0.499	0.002	0.814	0.001

<sup>a</sup>*P* < 0.05 vs preoperative.**Table 5 Comparison of operation time and postoperative recovery time between the two groups**

Groups	Cases	Operation time (min)	Postoperative recovery time (min)
Observation group	60	134.15 ± 32.45	15.51 ± 4.21
Control group	60	138.84 ± 38.80	19.46 ± 3.80
<i>t</i> value		-0.718	-5.395
<i>P</i> value		0.474	0.000

**Table 6 Comparison of mini mental state examination score between preoperative and postoperative**

Groups	Cases	Preoperative	Postoperative 1 d
Observation group	60	28.10 ± 2.01	25.51 ± 1.15 <sup>a</sup>
Control group	60	28.03 ± 1.82	24.12 ± 1.04 <sup>a</sup>
<i>t</i> value		0.200	6.944
<i>P</i> value		0.842	0.000

<sup>a</sup>*P* < 0.05 vs preoperative.

improving MAP and HR in patients undergoing brachial plexus block than anesthesia without dexmedetomidine.

In our study, MAP at T1, T2, and T3 in the observation group was significantly higher than that in the control group. HR at T1 was significantly lower than that in the control group, and HR at T2 and T3 were significantly higher than those in the control group. Postoperative recovery times in the observation group were significantly lower than those of the control group, indicating that ultrasonic-guided nerve block combined with dexmedetomidine in lower extremity fracture surgery was more helpful in improving hemodynamics and promoting postoperative recovery of patients than procedures without dexmedetomidine, which was consistent with the conclusions of previous studies. Dexmedetomidine can act on  $\alpha_2$  adrenergic receptors, inhibit sympathetic nerve excitation by activating

**Table 7 Comparison of complications between the two groups, *n* (%)**

Groups	Cases	Nausea and vomiting	Sleepiness	Respiratory depression	Bradycardia
Observation group	60	3 (5.00)	4 (6.67)	2 (3.33)	3 (5.00)
Control group	60	2 (3.33)	5 (8.33)	1 (1.67)	2 (3.33)
$\chi^2$		0.000	0.000	0.000	0.000
<i>P</i> value		1.000	1.000	1.000	1.000

prominent posterior membrane receptors, and reduce blood pressure and HR of patients. In addition, dexmedetomidine can significantly reduce the negative emotions and discomfort that can be induced by lower extremity fracture surgery through deep sedation. It can also reduce the brain tissue damage caused by anesthesia, stabilize the hemodynamic level of patients, and promote postoperative recovery of patients.

Further comparison of postoperative VAS scores of the two groups showed that the VAS score of the observation group was significantly lower than that of the control group at 2 h, 6 h and 12 h after surgery. Epinephrine and norepinephrine levels in the observation group were also significantly lower than those in the control group at 6 h after anesthesia. The MMSE score of the observation group was significantly higher than that of the control group 1d after the operation. Our results suggest that, in lower extremity fracture surgery, an ultrasound-guided nerve block combined with dexmedetomidine is helpful in improving the pain level of patients, inhibiting the secretion of epinephrine and norepinephrine, and improving cognitive function. A2 adrenergic receptors mainly exist in presynaptic and postsynaptic regions. The negative feedback mechanism can also regulate the release of adenosine triphosphate and norepinephrine to inhibit neuronal excitation and stop the transmission of pain signals. Meanwhile,  $\alpha_2$  adrenergic receptors in the spinal cord can specifically bind its agonist dexmedetomidine, which can effectively exert analgesic effects, reduce the VAS score of patients, inhibit stress response, and thus improve the postoperative cognitive function of patients.

This safety study found no significant difference in the incidence of complications between the observation and control groups, verifying that in lower extremity fracture surgery, ultrasound-guided nerve block combined with dexmedetomidine did not increase the incidence of complications, and the safety is generally controllable. Meta-analyses suggested that dexmedetomidine can activate  $\alpha_2$  adrenergic receptors in the spinal cord, block the discharge of neurons, reduce the pain-induced antisympathetic effect and unpleasant emotion, reduce the stress response during the operation cycle of patients, reduce the incidence of adverse reactions such as rapid heart rate and elevated blood pressure, and that it is safe and controllable under rational clinical administration[20-22].

Related studies[23,24] have shown that a high dose of dexmedetomidine administered during anesthesia maintenance can cause hypotension and bradycardia, which requires special clinical attention. In addition, patients with rapid intravenous infusion of dexmedetomidine are more prone to severe headache, hypertension, and other adverse symptoms. Therefore, intravenous infusion of dexmedetomidine is not recommended clinically. However, there are some limitations in this study, mainly including the small sample size and it being a single-center study. Further research with a larger sample size and across many institutions would be beneficial.

## CONCLUSION

In conclusion, ultrasound-guided nerve block combined with dexmedetomidine has a good anesthetic effect during the operative reduction of lower limb fractures and has little effect on the hemodynamics of patients.

## ARTICLE HIGHLIGHTS

### Research background

It is of great importance to develop an effective anesthesia program to effectively ensure the progress of surgery.

### Research motivation

This study developed an effective anesthesia program to effectively ensure the progress of surgery.

### Research objectives

Discusses the effect of ultrasound-guided nerve block combined with dexmedetomidine anesthesia in lower extremity fracture surgery.

### Research methods

A total of 120 patients admitted to our hospital with lower extremity fractures from January 2017 to December 2019 were selected. The control group received an ultrasound-guided nerve block. The observation group was treated with dexmedetomidine based on the control group.

### Research results

The mean arterial pressure of T1, T2 and T3 in the observation group were significantly higher than that of the control group. The observation group's heart rate (HR) times at T1 was significantly lower than that of the control group. The times of observation group's HR at T2 and T3 was significantly higher than that of the control group. The recovery time was significantly lower than that of the control group. Six hours post-anesthesia, epinephrine and norepinephrine in the observation group were significantly lower than that of the control group, and the mini-mental state exam score of the observation group was significantly higher than that in the control group.

### Research conclusions

Ultrasound-guided nerve block combined with dexmedetomidine has a good anesthetic effect in the operation of lower limb fractures and has little effect on the hemodynamics of patients.

### Research perspectives

We will explore the clinical effect of this method of anesthesia in other operations.

---

## FOOTNOTES

**Author contributions:** Ao CB and Wu WG designed this retrospective study; Ao CB wrote the manuscript; Ao CB, Lei P, Shao L and Yu JY were responsible for sorting the data; and all authors contributed to the article and approved the submitted version.

**Institutional review board statement:** The study was approved by the Ethics Committee of Yuhuan City People's Hospital, Taizhou City, Zhejiang Province.

**Informed consent statement:** Patients were not required to give informed consent to the study because the analysis used anonymous clinical data that were obtained after each patient agreed to treatment by written consent.

**Conflict-of-interest statement:** Nothing to disclose.

**Data sharing statement:** No additional data are available.

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

**Country/Territory of origin:** China

**ORCID number:** Cheng-Bin Ao 0000-0002-9011-6685; Ping-Lei Wu 0000-0002-1766-6437; Liang Shao 0000-0001-6419-9993; Jian-Ying Yu 0000-0001-9500-3703; Wei-Guo Wu 0000-0002-6808-3629.

**S-Editor:** Wang JL

**L-Editor:** A

**P-Editor:** Wang JL

---

## REFERENCES

- 1 Elhakeem A, Hartley A, Luo Y, Goertzen AL, Hannam K, Clark EM, Leslie WD, Tobias JH. Lean mass and lower limb muscle function in relation to hip strength, geometry and fracture risk indices in community-dwelling older women. *Osteoporos Int* 2019; **30**: 211-220 [PMID: 30552442 DOI: 10.1007/s00198-018-4795-z]
- 2 Langsetmo L, Peters KW, Burghardt AJ, Ensrud KE, Fink HA, Cawthon PM, Cauley JA, Schousboe JT, Barrett-Connor E, Orwoll ES; Osteoporotic Fractures in Men (MrOS) Study Research Group. Volumetric Bone Mineral Density and Failure

- Load of Distal Limbs Predict Incident Clinical Fracture Independent HR-pQCT BMD and Failure Load Predicts Incident Clinical Fracture of FRAX and Clinical Risk Factors Among Older Men. *J Bone Miner Res* 2018; **33**: 1302-1311 [PMID: 29624722 DOI: 10.1002/jbmr.3433]
- 3 **Haider IT**, Simonian N, Schnitzer TJ, Edwards WB. Stiffness and Strength Predictions From Finite Element Models of the Knee are Associated with Lower-Limb Fractures After Spinal Cord Injury. *Ann Biomed Eng* 2021; **49**: 769-779 [PMID: 32929557 DOI: 10.1007/s10439-020-02606-w]
  - 4 **Holborow J**, Hocking G. Regional anaesthesia for bilateral upper limb surgery: a review of challenges and solutions. *Anaesth Intensive Care* 2010; **38**: 250-258 [PMID: 20369756 DOI: 10.1177/0310057X1003800205]
  - 5 **Nan Y**, Yang QQ, Li XW, Li T, Li J. [Application of ultrasound guidance for fascia iliaca compartment block in pediatric femoral surgery]. *Zhonghua Yi Xue Za Zhi* 2017; **97**: 300-302 [PMID: 28162162 DOI: 10.3760/cma.j.issn.0376-2491.2017.04.013]
  - 6 **Sato M**, Simizu S, Kadota R, Takahasi H. Ultrasound and nerve stimulation-guided L5 nerve root block. *Spine (Phila Pa 1976)* 2009; **34**: 2669-2673 [PMID: 19910770 DOI: 10.1097/BRS.0b013e3181b43c62]
  - 7 **Takeuchi M**, Kamiya M, Wakao N, Osuka K, Yasuda M, Terasawa T, Yamada T, Takayasu M. A simple, 10-minute procedure for transforaminal injection under ultrasonic guidance to effect cervical selective nerve root block. *Neurol Med Chir (Tokyo)* 2014; **54**: 746-751 [PMID: 24614822 DOI: 10.2176/nmc.2013-0332]
  - 8 **Keating GM**. Dexmedetomidine: A Review of Its Use for Sedation in the Intensive Care Setting. *Drugs* 2015; **75**: 1119-1130 [PMID: 26063213 DOI: 10.1007/s40265-015-0419-5]
  - 9 **Kaye AD**, Chernobylsky DJ, Thakur P, Siddaiah H, Kaye RJ, Eng LK, Harbell MW, Lajaunie J, Cornett EM. Dexmedetomidine in Enhanced Recovery After Surgery (ERAS) Protocols for Postoperative Pain. *Curr Pain Headache Rep* 2020; **24**: 21 [PMID: 32240402 DOI: 10.1007/s11916-020-00853-z]
  - 10 **Constantin JM**, Momon A, Mantz J, Payen JF, De Jonghe B, Perbet S, Cayot S, Chanques G, Perreira B. Efficacy and safety of sedation with dexmedetomidine in critical care patients: a meta-analysis of randomized controlled trials. *Anaesth Crit Care Pain Med* 2016; **35**: 7-15 [PMID: 26700947 DOI: 10.1016/j.accpm.2015.06.012]
  - 11 **Tashjian RZ**, Hung M, Keener JD, Bowen RC, McAllister J, Chen W, Ebersole G, Granger EK, Chamberlain AM. Determining the minimal clinically important difference for the American Shoulder and Elbow Surgeons score, Simple Shoulder Test, and visual analog scale (VAS) measuring pain after shoulder arthroplasty. *J Shoulder Elbow Surg* 2017; **26**: 144-148 [PMID: 27545048 DOI: 10.1016/j.jse.2016.06.007]
  - 12 **Yoelin AB**, Saunders NW. Score Disparity Between the MMSE and the SLUMS. *Am J Alzheimers Dis Other Dement* 2017; **32**: 282-288 [PMID: 28503934 DOI: 10.1177/1533317517705222]
  - 13 **Trivedi D**. Cochrane Review Summary: Mini-Mental State Examination (MMSE) for the detection of dementia in clinically unevaluated people aged 65 and over in community and primary care populations. *Prim Health Care Res Dev* 2017; **18**: 527-528 [PMID: 28578720 DOI: 10.1017/S1463423617000202]
  - 14 **Gustafsson A**, Tognini M, Bengtsson F, Gasser TC, Isaksson H, Grassi L. Subject-specific FE models of the human femur predict fracture path and bone strength under single-leg-stance loading. *J Mech Behav Biomed Mater* 2021; **113**: 104118 [PMID: 33125949 DOI: 10.1016/j.jmbbm.2020.104118]
  - 15 **Casati A**, Santorsola R, Cerchierini E, Moizo E. Ropivacaine. *Minerva Anestesiol* 2001; **67**: 15-19 [PMID: 11778088]
  - 16 **Danoff JR**, Goel R, Henderson RA, Fraser J, Sharkey PF. Periarticular Ropivacaine Cocktail Is Equivalent to Liposomal Bupivacaine Cocktail in Bilateral Total Knee Arthroplasty. *J Arthroplasty* 2018; **33**: 2455-2459 [PMID: 29599033 DOI: 10.1016/j.arth.2018.02.083]
  - 17 **Chen G**, Gong M, Liu Y. Comparison of ropivacaine plus sufentanil and ropivacaine plus dexmedetomidine for labor epidural analgesia: A randomized controlled trial protocol. *Medicine (Baltimore)* 2020; **99**: e22113 [PMID: 32899094 DOI: 10.1097/MD.00000000000022113]
  - 18 **Chen Y**, Yan L, Zhang Y, Yang X. The role of DRP1 in ropivacaine-induced mitochondrial dysfunction and neurotoxicity. *Artif Cells Nanomed Biotechnol* 2019; **47**: 1788-1796 [PMID: 31062606 DOI: 10.1080/21691401.2019.1594858]
  - 19 **Videman D**, Portnyagin I, la Fleur P, Bilotta F. [Ropivacaine withdrawal syndrome: a case report]. *Braz J Anesthesiol* 2020; **70**: 66-68 [PMID: 32173065 DOI: 10.1016/j.bjan.2019.12.006]
  - 20 **Duan X**, Coburn M, Rossaint R, Sanders RD, Waesberghe JV, Kowark A. Efficacy of perioperative dexmedetomidine on postoperative delirium: systematic review and meta-analysis with trial sequential analysis of randomised controlled trials. *Br J Anaesth* 2018; **121**: 384-397 [PMID: 30032877 DOI: 10.1016/j.bja.2018.04.046]
  - 21 **Sohn JT**. Dexmedetomidine and erythrocyte deformability. *Bratisl Lek Listy* 2019; **120**: 240 [PMID: 31023044 DOI: 10.4149/BLL\_2019\_038]
  - 22 **Li ZB**, Li GC, Qin J. Dexmedetomidine Attenuates Lung Injury in Toxic Shock Rats by Inhibiting Inflammation and Autophagy. *Arch Med Res* 2021; **52**: 277-283 [PMID: 33248818 DOI: 10.1016/j.arcmed.2020.11.001]
  - 23 **Ren J**, Li C, Ma S, Wu J, Yang Y. Impact of dexmedetomidine on hemodynamics in rabbits. *Acta Cir Bras* 2018; **33**: 314-323 [PMID: 29768534 DOI: 10.1590/s0102-865020180040000003]
  - 24 **Ter Bruggen FFJA**, Ceuppens C, Leliveld L, Stronks DL, Huygen FJPM. Dexmedetomidine vs propofol as sedation for implantation of neurostimulators: A single-center single-blinded randomized controlled trial. *Acta Anaesthesiol Scand* 2019; **63**: 1321-1329 [PMID: 31321763 DOI: 10.1111/aas.13452]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

**Telephone:** +1-925-3991568

**E-mail:** [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)

**Help Desk:** <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

