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Original Article

Retrospective analysis and prediction model for vascular and nerve injuries in elderly patients following total knee arthroplasty

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Abstract: Objective: This study aimed to investigate the risk factors associated with vascular and nerve injury following total knee arthroplasty (TKA) in elderly patients and to develop, as well as validate, a corresponding predictive model. Methods: A cohort of 380 elderly patients who underwent TKA at Weifang People's Hospital was included. Participants were categorized into a vascular/nerve injury group (n=34) and a non-injury group (n=346). The incidence of postoperative vascular or nerve injury was documented. Risk factors were identified using chi-square tests and multivariate logistic regression analysis. The model's discrimination and calibration were assessed by the receiver operating characteristic (ROC) curve and the Hosmer-Lemeshow (H-L) test, respectively. Results: The incidence of vascular and nerve injury after TKA was 8.95%. Multivariate analysis identified the following independent risk factors: deformity correction ≥20° (OR=20.063, P<0.001), knee valgus ≥12° (OR=7.717, P=0.004), tourniquet time ≥2 h (OR=5.451, P=0.038), epidural anesthesia (OR=7.525, P=0.003), preoperative neuropathy (OR=24.906, P<0.001), and improper use of double-click electrocoagulation (OR=6.175, P=0.013). The H-L test indicated good calibration of the predictive model (P>0.05). The model's AUC was 0.806, with a sensitivity of 79.47% and specificity of 75.39%. Conclusion: In elderly patients undergoing TKA, close attention should be paid to several risk factors, including significant deformity correction (≥20°), knee valgus (≥12°), preoperative neuropathy, improper use of double-click electrocoagulation, epidural anesthesia, and prolonged tourniquet application (≥2 h). These factors are associated with an increased risk of vascular and nerve injury.

Keywords: Total knee arthroplasty, vascular, nerve injury, risk factors, prediction model

Introduction

The incidence of knee joint diseases has increased year by year with the aging of the population. Total knee arthroplasty (TKA) is a common joint reconstruction surgery in orthopedics, suitable for various joint diseases. It can replace damaged knee joint surfaces with artificial prostheses to eliminate pain, correct deformities, and improve knee joint mobility [1, 2]. In addition, patients with osteoarthritis who have severe or progressive knee joint deformities that require correction also undergo TKA surgery for treatment [3]. Patients who have poor conservative treatment effects such as medication, physical therapy, or injection can choose TKA treatment. TKA aims to alleviate these symptoms and restore function by replacing damaged knee joints with prosthetic components. This improves pain relief and enhances the overall well-being of patients [4].

TKA can effectively relieve pain, correct knee joint deformities, improve function, and enhance patients' quality of life, and is an important means of treating advanced knee joint disease. The surgical procedure is difficult to perform and requires high clinical standards for both the doctor and the operating room nurse. The individual differences of the patient and the intraoperative nursing plan will directly affect the postoperative rehabilitation effect of the patient [5]. However, the occurrence of postoperative complications caused

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by TKA is a fundamental reason for surgical failure, so it is very important to raise awareness of postoperative complications. Research has found that vascular and nerve damage is a rare but very serious complication after TKA surgery, with an incidence of vascular damage ranging from 0.17%-13.08% and nerve damage ranging from 0.3%-1.3%. Severe vascular and nerve damage can lead to numbness and weakness in the lower limbs, periprosthetic joint infections, amputation, and even death [6, 7]. There is still some controversy about the risk factors for vascular and nerve injury after total knee arthroplasty. This study mainly explores the possible risk factors for vascular and nerve injury after TKA surgery in our hospital, providing a theoretical basis for the later clinical surgical process or postoperative nursing process.

Materials and methods

Subject

Select elderly patients who underwent artificial knee replacement surgery in our orthopedic department from September 2020 to September 2024 as the research subjects. This study was approved by the Ethics Committee of Dongying People's Hospital, and all patients participated knowingly and voluntarily, and signed informed consent.

Inclusion criteria: (1) Patients undergoing knee replacement surgery for the first time. (2) Patients aged ≥60 years. (3) All patients met the indications of artificial knee replacement. (4) The patient's data is complete during the perioperative period and postoperative follow-up time. (5) Patients had no surgical contraindications. (6) All of them had single knee catheterization, and the surgical materials were the same imported materials, and the surgical incisions were Class I clean surgical incisions.

Exclusion criteria: (1) Serious complications occurred within 30 days of surgery, including infection, deep vein thrombosis, pulmonary embolism, stroke, myocardial infarction, or severe organ failure. (2) People with blood clotting disorders. (3) Patients undergoing other operations within ten days, or patients with malignant tumors found within six months. (4) Patients with surgical intolerance. (5) Patients who were bedridden for a long time before surgery. (6) Patients who could not cooperate due to cultural, linguistic, cognitive and other reasons.

Surgical methods

All patients were operated on by the same team of physicians using a conventional medial parapatellar approach. All patients were given endotracheal intubation combined with intravenous anesthesia or continuous epidural combined with subarachnoid block anesthesia. Antibiotics (second-generation cephalosporin) were routinely administered 30 min before surgery. Depending on the patient's BP, we may apply a tourniquet bag. The anterior median approach and medial parapatellar approach of the knee joint were adopted. After initial release, the femoral or tibial bone was first dissected according to the habits of different operators or the anatomic characteristics of the affected knee. The stability of flexion and extension was then tested with a prosthesis model and suitable spacers to further confirm that the soft tissue balance of the knee joint was well balanced. The stability of patellofemoral joint was observed under dynamic conditions and the patellofemoral trajectory was understood. After confirmation, the bone bed was pulsed, the bone cement was modulated, and the prosthesis was installed.

Postoperative management

Anticoagulation with low molecular weight heparin was administered 12 h after surgery, and venous pump of lower limb was administered 3 days after surgery. Antibiotics were used to prevent infection in all patients within 24 h after surgery, and the antibiotic use time was extended appropriately for patients with low immunity or elderly patients. All patients were treated with ice to reduce swelling. All patients began to receive appropriate rehabilitation training on the 2nd day after surgery. For patients with preoperative joint stiffness or limited flexion, continuous passive motion (CPM) was used for passive exercise, and the range of motion (ROM) of the knee joint should reach 90° before discharge.

Observation index

We recorded general patient information, including age, gender, body mass index (BMI),

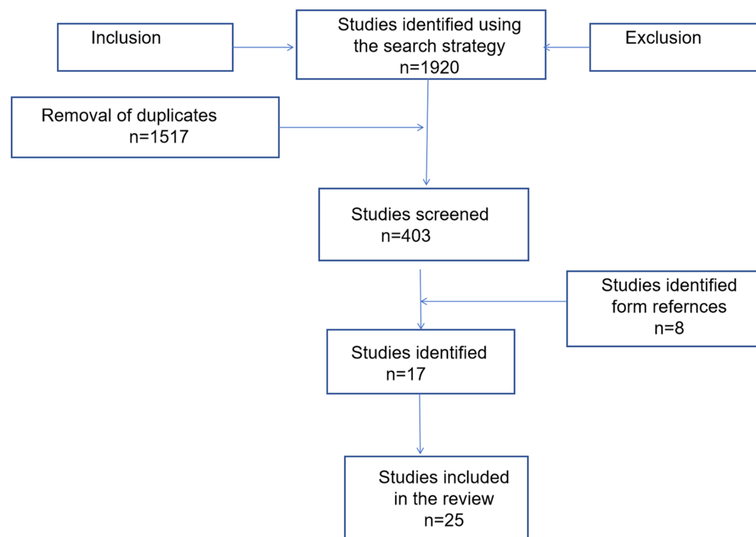

Figure 1. Flow chart of the literature selection process.

and medical history. We recorded clinical data of patients, including previous vascular or neurological disorders, use of tourniquets, preoperative eversion deformity, flexion contracture, and use of postoperative epidural anesthesia.

Postoperative follow-up

We recorded the occurrence of postoperative complications in patients, including postoperative pain, postoperative knee joint effusion, postoperative lower limb deep vein thrombosis and/or pulmonary embolism, postoperative incision complications, postoperative artificial joint periprosthetic infection, postoperative prosthesis aseptic loosening, postoperative joint stiffness, and postoperative periprosthetic fractures.

We recorded the patient's vascular and nerve damage. Vascular injury was detected if postoperative examination showed enlarged hematoma or pulsatile hematoma, swelling of the affected limb, pale skin, no bleeding at the toe of the affected limb when punctured with a needle, or a decrease in skin temperature of the affected limb. Angiography was also used to assist in diagnosis. The basis for detection of common peroneal nerve injury was sensory impairment in the dorsal area of the affected limb and the anterior lateral side of the calf, inability to dorsiflex the foot, inability to extend the toes, or inversion and sagging of the foot. The diagnosis was made through physiological testing using electromyography and nerve conduction velocity.

Search strategy

A comprehensive systematic search was conducted using PubMed, Medline, and Scopus databases. "Total knee replacement, nerve injury, nerve paralysis, complications" were used as search terms. The flowchart of the literature selection process is shown in **Figure 1**.

Statistical analysis

EXCEL software was used for data recording and organization, and SPSS 23.0 (IBM, Amonk, New York, USA) software was used for data analysis. The counted data were expressed as n (%), and the comparison between groups was performed using χ^2 and Fisher's tests. Measured data that conformed to a normal distribution were presented as mean ± SD. Binary Logistic regression analysis was used to analyze the independent risk factors for vascular and nerve injury after knee arthroplasty. The objective was to construct a predictive model of vascular and nerve injury after TKA in the elderly based on risk factors. Receiver operating characteristic (ROC) curve and Hosmer-Lemeshow (H-L) test were used for the discrimination and calibration of the prediction model. $P<0.05$ was considered significant.

Results

Analysis of general patient information

A total of 380 patients were enrolled, including 202 females and 178 males (**Table 1**). The age range was 60-83 years old, with an average age of (68.43 ± 11.04) years. The average body mass index (BMI) was (23.77 ± 4.65) kg/m^2. The initial diagnosis was knee osteoarthritis (126 cases), rheumatoid arthritis (151 cases), and traumatic arthritis (103 cases). The patient's preoperative course was 0.5-30 years, with an average of (12.45 ± 4.79) years. There were 31 patients with diabetes, 75

Table 1. General information of patients

Index	n/Mean ± SD
Females/Males	202/178
Age (years)	68.43 ± 11.04
BMI (kg/m^2)	23.77 ± 4.65
Disease type	
knee osteoarthritis	126
rheumatoid arthritis	151
traumatic arthritis	103
preoperative course (years)	12.45 ± 4.79
Comorbidities	
diabetes	31
hypertension	75
other chronic diseases	43

BMI: body mass index.

patients with hypertension and 93 patients with other chronic diseases.

Postoperative recovery of knee joint function

The preoperative knee joint ROM of the patient ranged from 30°-130°, with an average of (89.29 ± 20.37)°. After surgery, it increased to (99.56 ± 13.25)°, and the difference before and after surgery was significant (t=3.130, P<0.05).

Incidence of complications and vascular and nerve damage

Postoperative complications mainly included postoperative pain, postoperative knee joint effusion, pulmonary infection, delayed healing of wounds, with 10 (2.63%) cases, 2 (0.52%) cases, 3 (0.79%) cases and 7 (1.84%) cases, respectively. There were 27 (7.11%) cases of simple vascular injury, 3 (0.79%) cases of simple nerve injury, and 4 (1.05%) cases of simultaneous vascular and nerve injury (**Figure 2**).

Univariate analysis of influencing factors for vascular and nerve injury after TKA surgery

Patients were divided into two groups based on whether they experienced vascular and nerve injury: vascular and nerve injury group (n=34) and vascular and nerve noninjury group (n=346). Univariate analysis of the influencing factors of vascular and nerve injury (**Table 2**). Univariate analysis showed that hypertension, diabetes, knee joint disease, degree of deformity correction, intraoperative blood loss, preoperative neuropathy, epidural anesthesia, and inappropriate use of double click electrocoagulation significantly affected the occurrence of postoperative vascular neuropathy.

Differences in hospital for special surgery knee score (HSS) of knee joint in two groups of patients

The two groups of patients were evaluated for knee joint HSS function score on the day before surgery, 14 days after surgery, and 28 days after surgery, respectively. There was no significant difference in HSS scores between the two groups of patients before surgery. At 14 and 28 days after surgery, the HSS scores of patients in the vascular and nerve injury group were significantly lower than those of the vascular and nerve noninjury group (P<0.01) (**Figure 3**). In addition, the HSS scores in both groups at 14 and 28 days after surgery were significantly higher than those before surgery (P<0.01).

Differences in pain visual analog scale (VAS) between the two groups of patients

VAS scores were used to evaluate the pain levels of two groups of patients on preoperative day 1, postoperative day 1, postoperative day 14, and postoperative day 28. There was no significant difference in VAS scores between the two groups of patients on day 1 before and day 1 after surgery (P>0.05) (**Figure 4**). On postoperative day 14 and 28, both patients showed a significant decrease in VAS scores (P<0.01), and patients in the vascular and nerve noninjury group had significantly lower VAS scores than those in the vascular and nerve injury group (P<0.01).

Multivariate binary logistic regression analysis of risk factors for vascular neuropathy after TKA

Logistic multifactor regression analysis was carried out for the above significant influencing factors. The variable assignment method is shown in **Table 3**, and the multifactor regression analysis is shown in **Table 4**. The results showed that degree of deformity correction ≥20° (OR=20.063, P<0.001 knee valgus ≥12° (OR=7.717, P=0.004), duration of use of tourniquet ≥2 h (OR=5.451, P=0.038), epidural anesthesia (OR=7.525, P=0.003), preoperative

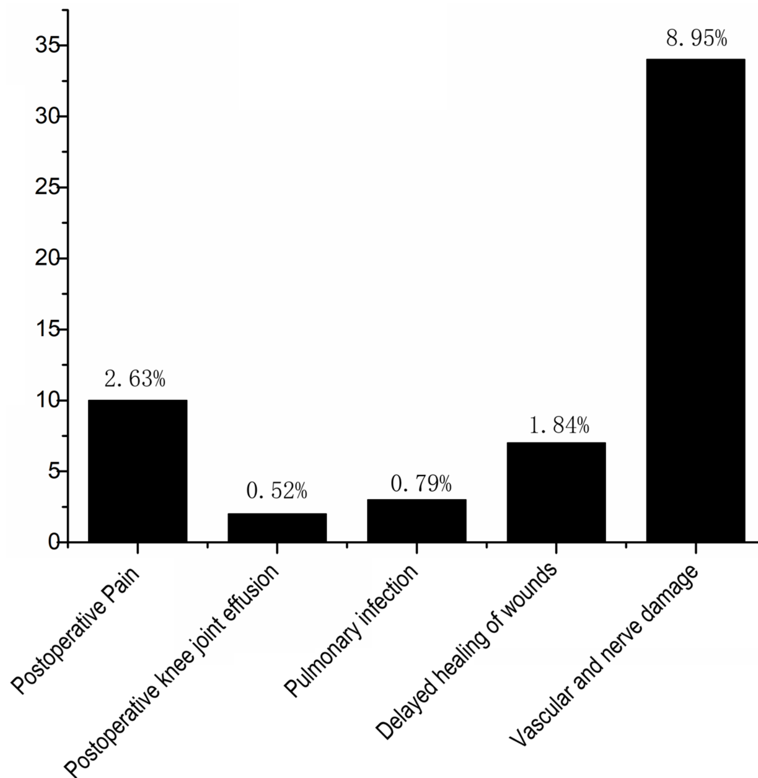

Figure 2. Incidence of complications and vascular and nerve damage.

neuropathy (*OR*=24.906, *P*=0.000) and improper use of double clicking electrocoagulation (*OR*=6.175, *P*=0.013) were risk factors for vascular nerve injury after TKA.

Establishment and validation of predictive model for vascular neuropathy after TKA

The relevant factors screened by logistic regression analysis (degree of deformity correction, knee valgus, duration of use of tourniquet, epidural anesthesia, preoperative neuropathy, improper use of double clicking electrocoagulation) were numbered as X1, X2, X3, x4, X5, X6. The partial regression coefficients of each predictor were extracted to fit the regression equation of the risk prediction model of vascular neuropathy in patients after TKA: logit (P) = -23.355 + 2.999×1 + 2.043×2 + 1.696×3 + 2.018×4 + 3.215×5 + 1.821×6. The H-L test was used to test the fitting degree of the model, and the test results showed that χ^2= 12.346, *P*=0.847, indicating that there was no obvious difference between the predicted value and the actual value, and the fitting degree of the model was good.

ROC curve analysis showed that the area under the curve (AUC) of the above prediction model for predicting vascular neuropathy after TKA in the elderly was 0.806 (95% CI: 0.702-0.910, P<0.001), and the sensitivity and specificity were 79.47% and 75.39%, respectively (**Figure 5**). This shows that the constructed risk prediction model had good discrimination.

Discussion

Clinical practice and follow-up results have shown that TKA is an effective method for relieving pain and improving quality of life in severe knee joint diseases, and can achieve good therapeutic effects [8]. Due to the unique anatomic location and structure of the knee joint, the success of TKA surgery is related to various factors such as the patient's health status, prosthesis type, doctor's skills and experience, postoperative rehabilitation measures, as well as psychological and social problems, which can lead to various systemic or local complications after surgery. Complications of blood vessels or nerves during or after TKA surgery are not common, but they can be potentially destructive. Sundaram et al. reported 767 cases of severe vascular injury (0.05%) among 1,419,557 total knee arthroplasty cases in 10 studies. About 21% of patients experience amputation or long-term neurological complications after severe vascular injury. About 36% of the cases showed symptoms after 24 hours. The geniculate body artery, popliteal artery, superficial femoral artery, and anterior tibial artery are the most susceptible blood vessels to injury, and femoral artery occlusion, popliteal artery transection, and popliteal artery arteriovenous fistula are the most likely to lead to amputation [7]. Most of the nerve damage after TKA is neurological disorders, with damaged myelin sheaths.

Table 2. Univariate analysis results of influencing factors of vascular and nerve injury after TKA surgery

Index	Vascular and nerve injury group (n=34)	Group without vascular and nerve damage (n=346)	χ^2	*P*
Gender			0.111	0.739
Female	19	183		
Male	15	163		
BMI (kg/m^2)			3.145	0.076
≥25	19	139		
<25	15	207		
hypertension			20.255	<0.001
Yes	20	55		
No	14	191		
diabetes			22.513	<0.001
Yes	10	21		
No	24	325		
knee valgus			25.318	<0.001
≥12°	27	122		
<12°	7	224		
Degree of deformity correction			56.528	<0.001
≥20°	31	94		
<20°	3	248		
Surgical duration (min)			3.221	0.073
≥100	21	158		
<100	13	188		
Intraoperative bleeding volume (mL)			5.527	0.019
≥120	23	161		
<120	11	185		
Duration of use of tourniquet (h)			14.942	<0.001
≥2	26	145		
<2	8	201		
Preoperative neuropathy			65.967	<0.001
Yes	29	72		
No	5	274		
Epidural anesthesia			23.038	<0.001
Yes	28	137		
No	6	209		
Improper use of double clicking electrocoagulation			29.958	<0.001
Yes	21	69		
No	13	277		

BMI: body mass index.

The axon itself is not damaged, and nerve function may recover when the myelin sheath heals. If axonal injury occurs, the neural pathway will be disrupted and the prognosis will be more severe, but complete recovery may still be possible. Neural injury is the most severe form of nerve damage, involving complete destruction of myelin sheaths and axons, and even with microsurgical intervention, the prognosis is the worst [9]. Severe damage to the common peroneal nerve can result in typical symptoms of foot prolapse, manifested as sensory loss and

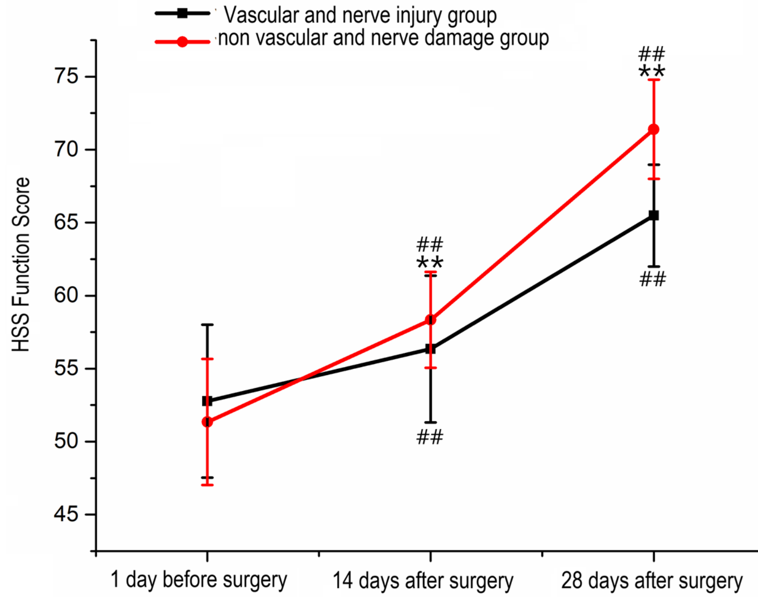

Figure 3. Differences in hospital for special surgery knee score (HSS) of knee joint in two groups of patients. Compared to the day before surgery, $^{\#\#}P$<0.01. Compared to the vascular and nerve injury group, $^{**}P$<0.01.

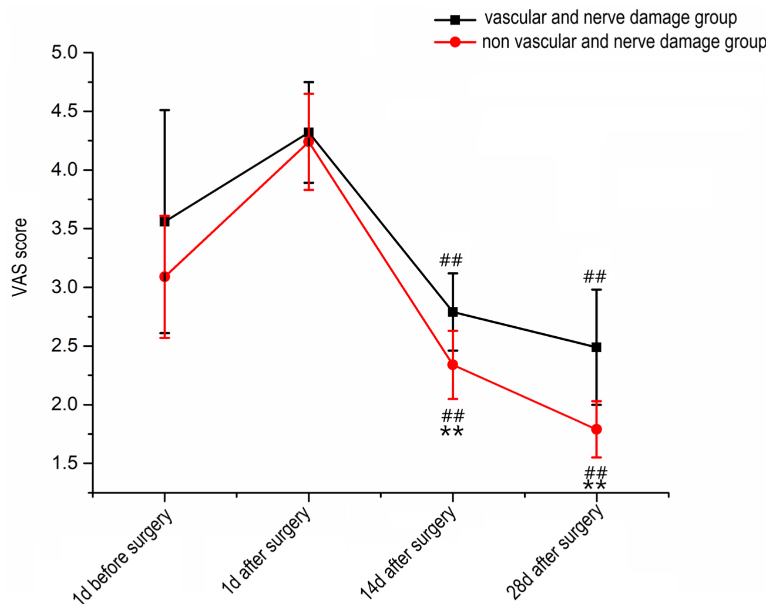

Figure 4. Differences in pain visual analog scale (VAS) between two groups of patients. Compared to the day before surgery, $^{\#\#}P$<0.01. Compared to the vascular and nerve injury group, $^{**}P$<0.01.

impaired motor function, including sensory disorders of the skin on the anterior lateral side of the calf and the dorsum of the foot, as well as functional disorders such as thumb and toe extension [10, 11].

We found that the incidence of vascular and nerve injury after TKA was 8.95%. Univariate analysis showed that hypertension, diabetes, knee joint disease, degree of deformity correction, intraoperative bleeding, preoperative neuropathy, epidural anesthesia and improper use of double click electrocoagulation could significantly affect the occurrence of postoperative angioneuropathy. Multivariate regression analysis showed that degree of deformity correction ≥20°, knee valgus ≥12°, tourniquet use time ≥2 h, improper use of epidural anesthesia and double click electrocoagulation were risk factors for vascular and nerve injury after TKA. Padegimas et al. studied the complications of 9,951 TKA patients and found that the probability of vascular injury was 0.13% (including 1 patient with common peroneal nerve injury), and the factors influencing vascular injury included age, female gender, race BMI, flexion contracture, varus coronal misalignment, and valgus misalignment [12]. Therefore, it is necessary to take certain measures to reduce the incidence of vascular or neurological complications. Careful screening of previous vascular disease history and patient physical condition before surgery can help identify high-risk patients.

Previous studies have shown that severe eversion (>12°) and flexion deformity (>20°) of the knee joint are closely related to fibular nerve injury. When correcting deformities, the tension on the fibular nerve and surrounding soft tissues is significantly increased compared to normal knee joints, and the resulting nerve

Table 3. Assignment method of independent variables

Variable	Evaluation
Hypertension	Yes=0, No=1
Diabetes	Yes=0, No=1
Knee valgus	≥12°=0, <20°=1
Degree of deformity correction	≥120 mL=0, <120 mL=1
Intraoperative bleeding volume	≥2 h=0, <2 h=1
Duration of use of tourniquet	Yes=0, No=1
Preoperative neuropathy	Yes=0, No=1
Epidural anesthesia	Yes=0, No=1
Improper use of double clicking electrocoagulation	Yes=0, No=1

Table 4. Multivariate binary logistic regression analysis of risk factors for vascular neuropathy after TKA

Index	*β*	*SE*	*Wald*	*P*	*OR*	*95% CI*
Hypertension	0.743	0.635	1.372	0.242	2.103	0.606-7.292
Diabetes	1.750	0.836	3.383	0.056	5.753	0.718-19.595
Knee valgus	2.043	0.719	8.084	0.004	7.717	1.887-31.568
Degree of deformity correction	2.999	0.810	13.724	0.000	20.063	4.105-98.053
Intraoperative bleeding volume	1.075	0.691	2.422	0.120	2.929	0.757-11.338
Duration of use of tourniquet	1.696	0.817	4.309	0.038	5.451	1.099-27.028
Preoperative neuropathy	3.215	0.756	18.107	0.000	24.906	5.665-109.508
Epidural anesthesia	2.018	0.684	8.697	0.003	7.525	1.968-28.775
Improper use of double clicking electrocoagulation	1.821	0.733	6.168	0.013	6.175	1.468-25.981
constant	-23.355	4.334	29.041	0.000	0.000	

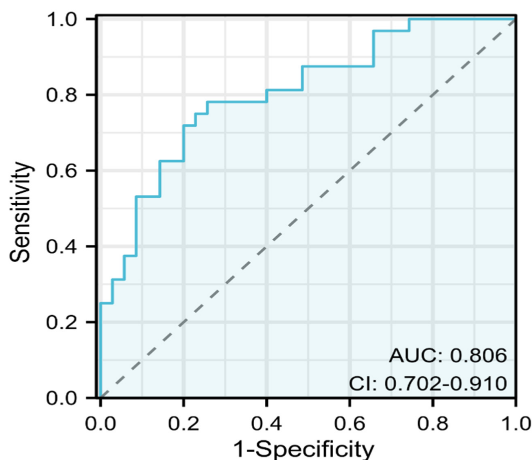

Figure 5. ROC curve analysis showed that the area under the curve (AUC) of the above prediction model for predicting vascular neuropathy after TKA in the elderly was 0.806 (95% CI: 0.702-0.910, P<0.001).

elongation or peripheral blood supply damage is the main mechanism of injury [13, 14]. Studies have shown that a 4%-11% extension of the human nervous system can lead to severe axonal injury. An 8% extension of rabbit nerves leads to microcirculatory damage, and the more severe the deformity, the greater the potential damage [15]. Christ et al. found in their study of 383,060 cases that preoperative eversion is an important risk factor for nerve injury (*OR*=4.19, *P*<0. 0001) [16].

In addition to preoperative knee valgus deformity, previous spinal pathology, postoperative epidural anesthesia (EDA), and prolonged tourniquet inflation time are also associated with peroneal nerve injury [16]. Innovations in anesthesia techniques for improving the recovery of motor reserve areas include targeted surgical local infiltration analgesia, adductor muscle block, knee nerve block, and infiltration between the popliteal artery and the posterior capsule of the knee (iPACK) block. Different anesthesia regimens are also important influencing factors for peroneal nerve injury [17]. Compared to patients who only received general anesthesia or lumbar anesthesia, the risk of peroneal nerve paralysis increased by 2.8

times. Epidural anesthesia, neurotoxicity of local anesthetics, and local ischemia caused by vasoconstrictors in local anesthetics were suspected to cause spinal nerve and nerve root damage. Tsukada et al. pointed out that the incidence of temporary peroneal nerve paralysis during epidural analgesia is significantly lower than that of local infiltration anesthesia around the joint, which may be related to direct needle puncture of the peroneal nerve during local infiltration analgesia [18]. Therefore, they advocate avoiding excessive injection of infiltration anesthesia drugs during posterior operation. Park et al. found no significant correlation between CPNP and EDA [19], while Beller et al. found EDA to be an important risk factor [20]. Høvik Ø et al. believe that the mechanism may be the loss of sensation, proprioception, and sometimes the loss of motor control, making nerves more susceptible to external compression trauma [15].

Among various factors such as tourniquet pressure, usage time, and type, tourniquet pressure is the easiest to control and also the most susceptible to misuse [21]. Tourniquets are widely used in total knee arthroplasty to prevent intraoperative bleeding and shorten surgical time. However, improper use can cause complications such as tourniquet paralysis. Multiple studies have shown that tourniquets can damage nerves through direct cutting and indirect mechanical compression, and are closely related to myelin dysfunction, Langerhans node displacement, axial depolarization caused by compression induced ischemia, and hyperpolarization after compression relief [22, 23]. Research has found that there is a close correlation between common peroneal nerve injury and the duration of tourniquet use [13]. It is recommended to relax for 10-30 minutes when extending the use of tourniquets to provide reperfusion time. Jacob et al. also confirmed the relationship between the duration of tourniquet use and nerve damage, stating that for every 30 minutes increase in tourniquet time, the risk of nerve damage increases by 1.28 times [24].

The hemostatic effect of bipolar electrocoagulation during surgery has been recognized by orthopedic surgeons, especially when there is aggressive use of the technique by the surgeon and a potential danger to the common peroneal nerve due to the obstruction of the posterior femur during the operation in the posterior space of the knee joint [25]. Lyons et al. found through comparing bipolar electrocoagulation and standard electrocoagulation in hemostasis of the posterior knee joint during initial total knee replacement surgery, that the former had a significantly higher incidence of neuropathy than the latter [26]. However, compared to the standard electrocoagulation group, bipolar electrocoagulation has the advantages of clear hemostatic targets and stronger tissue protection, and has been widely used in orthopedics and neurosurgery [27]. Lyons et al.'s study also showed that women with low body mass index and rheumatoid arthritis patients are more likely to damage the peroneal nerve when using bipolar electrocoagulation for hemostasis [26]. Due to the increasing risk of nerve burns caused by bipolar electrocoagulation with increasing power, it is not advisable to blindly increase the output power of electrocoagulation to ensure optimal surgical outcomes while maintaining stable output power as much as possible.

In addition, diabetes also causes nerve cell damage through microvascular disease, oxidative stress, hyperglycemic toxicity, and other pathogenic mechanisms. Park et al. found that high body mass index is more likely to cause fibular nerve injury, which can be explained by the difficulty of exposure during surgery in obese patients, increasing the opportunity to pull nerves. Obese patients tend to rotate the hip joint outward when lying down after surgery, which increases the possibility of compression of the peroneal nerve at the level of the fibular head [19].

The prevention and treatment methods for vascular and nerve damage after TKA mainly include: (1) surgical incision improvement. Slattery [28] et al. conducted a systematic review study of 664 TKA patients, evaluating the incidence of knee joint skin numbness, pain, and complications during an average one-year follow-up time after different incisions. The results showed that 15% of patients in the anterior lateral incision group experienced persistent numbness around the incision, while 62% of patients in the midline incision group experienced this symptom. At the same time, patients in the anterior lateral incision group had better kneeling ability and no increase in the incidence of complications.

Other considerations were: (2) Intraoperative separation to protect nerves. (3) Reasonable use of anesthesia drugs and postoperative pain relief plans. Surgical stress response and inflammatory response are the main causes of postoperative periprosthetic infection and deep vein thrombosis in patients undergoing TKA, which seriously affect their postoperative recovery. Reasonable use of anesthetic drugs can reduce postoperative oxidative stress and inflammatory reactions in patients, maintain hemodynamic stability, and alleviate postoperative pain [29, 30]. (4) Acute fibular decompression treatment. Johnson [31] *et al.* found that acute decompression of acute CPNP after total knee arthroplasty was a cautious treatment option that can provide good functional outcomes and rapid recovery. To sum up, the common causes of vascular and nerve injury after TKA are: (1) The patient's basic medical history, including obesity, diabetes, and atherosclerosis; (2) Improper use of tourniquets; (3) For patients with severe flexion deformity, the there may be damage after deformity correction. In addition, improper handling by the operator during the surgical process (such as puncturing blood vessels) can also cause vascular damage.

This study had certain limitations. The sample size of patients with vascular and nerve injury after TKA was relatively small, and large-scale and diverse studies are needed.

Disclosure of conflict of interest

None.

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