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Contents

Original Articles

ORIGINAL ARTICLE

Development of NCOVID-19 Colloidal Gold Immunochromatographic Test Strip

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Abstract: Purpose: To establish a fast, simple and accurate method and immunoassay test card for the detection of new coronavirus (nCOVID-19) antigen. Methods: In this study, colloidal gold immunochromatography technology was used to detect nCOVID-19 virus antigens through the sandwich method. At the same time, the preparation plan of colloidal gold was improved, and the application of rapid immune-diagnosis technology in other fields was developed. In this study, purified recombinant nCOVID-19 nucleocapsid protein is used as the antigen to prepare murine monoclonal antibodies. The BN02 antibody produced by the mouse is used as the detection antibody to couple with colloidal gold, forming a gold-labeled complex probe. BN9m1 is used as the coating antibody for the C-line, and ProA is used for the T-line. The polymerization of colloidal gold particles enables us to detect the new coronavirus antigen's appearance. Thus an in vitro rapid detection kit for virus detection can be made. Results: The positive detection rate of the antigen quality control serum with this colloidal gold reagent was 100%. The specificity was 100%, and the sensitivity was 1ng/ml. Conclusion: The nCOVID-19 antigen detection reagent (colloidal gold method) developed in this research has high specificity and sensitivity, and can be used in conjunction with nucleic acid detection. As a means of detecting nCOVID-19, it can achieve qualitative and rapid screening of samples with advantage such as accuracy, repeatability, and low cost.

Keywords: NCOVID-19; Colloidal Gold Immunochromatographic Stripe; Nucleocapsid Protein

1. Experimental equipment and materials

1.1 Experimental equipment

Ultraviolet spectrophotometer, PCR instrument, electronic balance (accuracy to two decimal places), pipette, ultra-clean workbench, portable pressure steam sterilizer, shaking shaker, constant temperature water bath, electrophoresis instrument, ultraviolet analyzer.

1.2 Experimental materials

Solid NaCl, yeast powder, peptone, agar powder, Na_2HPO4, NaH_2PO4, Mix solution, DNA template, DNA upper and lower primers, agarose, 1XTAE, fluorescent green dye, solution P1 (containing RNaseA), solution P2 (main ingredients NaOH, SDS) , solution P3 containing acidic substances, washing solution WB, casein, nitrocellulose membrane, filters and membranes, glass cellulose membrane, absorbent pad, stickers, pad, 2% BSA, 2.5% sucrose, 1% spit Temperature-20, 0.3% PVPk30, 0.02% sodium azide, 1% trisodium citrate, potassium carbonate, sodium chloride, chloroauric acid tetrahydrate, Tris-base, HCI, glass fiber filter paper, water-absorbing material membrane, 0.1 % PEG20000, 0.5% BSA, 0.1%

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NaN_3 $NaHCO_3$, KH_2PO4, KCl, borax, boric acid, 0.22 micron filter membrane[1].

2. Research methods and procedures

2.1 Preparation of antigen

2.1.1 PCR

Use 2X mix (containing Mg^{2+}, Taq enzyme, DNTP, etc.), 25 microliters, 22 microliters of water, 1 microliter of template, and 1 microliter of upstream and down-stream primers to configure a 50 microliter reaction system into the PCR tube. Set the lid temperature to 105°C. Pre-denaturation 95℃ for 3min. Denaturation at 98°C for 10s; annealing at 68°C for 20s; extension at 72°C for 45s. A total of 39 cycles were cycled from denaturation to extension, and the annealing temperature was reduced by 0.5°C for each cycle. After the end of the cycle, it was set to continue to extend at 72°C for 5 minutes to ensure that all fragments were fully extended. Finally, set a storage temperature of 4°C to prevent DNA degradation.

2.1.2 Agarose gel electrophoresis

Prepare a 1% agarose solution, pour it into the identification glue tank and the recovery glue tank respectively, insert the comb, and wait for about 30 minutes for the gel to solidify before taking it out. Pour 1X TAE buffer into the electrophoresis tank, and use a pipette to pipette the PCR amplification solution and Marker for spotting. Stop the electrophoresis when the Marker moves to the middle of the gel. An ultraviolet analyzer was used to measure the spectrum. Cut the gel where the target DNA is located, add GDP sol agent, and centrifuge for DNA gel recovery.

2.1.3 Preparation of LB medium

Configure 1L LB liquid medium containing 1% peptone, 0.5% yeast, and 1% NaCl. The solid medium was added 1.5% to 2% agar on this basis. After the addition was dissolved and its pH was adjusted to 7.0, it was put into a portable pressure steam sterilizer for sterilization at 121°C for 20 minutes. After the end, the solution was cooled to 60 degrees, and kanamycin was added in the ratio of kanamycin: culture solution = 1:1000 and mixed. Pour the warm solid culture medium into a petri dish. The solid culture medium in each petri dish was about 10ml. This step was completed on the ultra-clean workbench.

2.1.4 Conversion

Use restriction endonuclease to cut the DNA and clone vector obtained by PCR, and use T4 ligase and its buffer to connect the two in a connect meter set at 16°C. This process took 2 hours. After completion, mix the bacterial liquid with the competent cells of E. coli and bath in ice for 30 minutes to allow the surface of E. coli to form liquid crystals that can adsorb DNA. Then heat-shock the competent cells of E. coli at 42°C for 90 s repeatedly to make the DNA enter E. coli, and then ice bath for 2 min. Finally, the bacteria solution was coated on the plate and placed in a biochemical incubator at 37°C for 12 hours to allow E. coli to form monoclonal colonies.

2.1.5 Plasmid extraction

Mainly use alkaline lysis method for plasmid extraction of Escherichia coli. Put the bacterial solution in a centrifuge, at 13000r/min for 1min, and remove the supernatant after taking it out. P1 was added to resuspend the bacteria, then add P2 (containing alkaline substances, such as NaOH and SDS), shake and mix, and then add P3 (containing acidic substances) to refold the plasmid. The supernatant was extracted and put into the filter column and then centrifuged at 12000r/min for 30s. Pour out the lower clear liquid, rinse twice and centrifuge twice. Let dry. The plasmid DNA on the filter column is recovered. Then the DNA is sequenced.

2.2 Antigen identification

2.2.1 Transfer of Escherichia coli

After confirming the successful implantation of the target gene, the colony of Escherichia coli amplified on the liquid medium was transferred to the LB liquid medium. Place it on an orbital shaker and shake at room temperature for 24 hours to supply oxygen to E. coli to survive and proliferate in large numbers.

2.2.2 SDS-PAGE

Prepare 30% polyacrylamide solution, 5XTris-glycine electrophoresis buffer, 5XSDS-PAGE loading buffer, Coomassie brilliant blue R-250 staining solution, and Coomassie brilliant blue staining decolorizing solution.

Configure 10ml separating gel (see **Table 1** for components) and 10ml concentrated gel (see **Table 2** for components).

Table 1. 10ml separating gel

Composition	Volume(mL)
ddH_20	3.3
30% polyacrylamide	4.0
1.5M Tris-HCl(pH8.8)	2.5
10% SDS	0.1
10% Ammonium persulfate	0.1
TEMED	0.004

Table 2. 10ml concentrated gel

Composition	Volume(mL)
ddH_20	6.8
30% polyacrylamide	1.7
1.5M Tris-HCl(pH8.8)	1.25
10% SDS	0.1
10% Ammonium persulfate	0.1
TEMED	0.01

First take 4ml of separating glue and add it to the glue maker, then add distilled water on top. Let it stand for 20 minutes, and then the separating glue would solidify. Pour out the distilled water, add the concentrated glue until the liquid level is flush with the top of the glass plate, insert the comb, and concentrate the glue after 5-10 minutes. After solidification, remove the glass plate, pull out the comb horizontally, and insert the remaining part into the electrophoresis tank.

Dilute 5X Tris-Glycine running buffer five times into the electrophoresis tank, pass the sample hole, and then start spotting (protein and marker). After spotting, set the parameters of the electrophoresis instrument to 120V, 90mA, and power on to start electrophoresis. Stop the electrophoresis when the protein marker runs to the bottom of the gel.

The gel was taken out in water, stained with Coomassie Brilliant Blue R-250 stain, and then decolorized with Coomassie Brilliant Blue Decolorizing Solution, and the protein bands were compared with the Marker[2].

2.3 Preparation of colloidal gold

This experiment used the trisodium citrate reduction method for the preparation of colloidal gold. First, prepare a 0.1% chloroauric acid solution, dilute 10 ml ten times with a 0.22 micron filter membrane, and place it on an induction cooker at 1200°C and heat it to boil. Start adding the prepared 1% trisodium citrate solution and adjust the temperature to 1000°C. When the solution started to show a pale pink color, after dripping 2ml of trisodium citrate solution, stop dripping the trisodium citrate solution and adjust the temperature to 800°C. During this period, the solution was continuously stirred to make it evenly mixed, and the color of the solution changed from light pink-pink-dark pink-purple red. Continue heating for 11 minutes and turn off the power of the induction cooker, and took it off after the purple-red translucent colloidal gold had cooled. The Tyndall effect can be used to verify its quality. After the preparation, the colloidal gold was put into a centrifuge tube and stored under refrigeration at 4°C.

2.4 Preparation of protein-colloidal gold complex

2.4.1 Preparation of reagents used

(1) 0.1mol/L Na_2CO_3

Weigh 1.06g of Na_2CO_3, add ddH_2O, and dilute to 100mL.

(2) Preparation of pH 7.4 0.01mol/L phate buffer (PB)

A liquid 0.2mol/L Na2HP04 B liquid 0.2mol/L NaH_2PO_4

Take 81.0ml of A solution and add 19ml of B solution, then add 1900ml ddH20 and 17g NaCl, which is a pH7.4 0.01mol/L PBS solution.

(3) Preparation of 10% NaCl

Weigh 10g of NaCl, measure ddH_2O, and dilute to 100mL.

(4) Preparation of 10% BSA

Weigh 5g of BSA, and dilute ddH_2O to 50mL.

(5) Preparation of resuspension liquid I

Weigh BSA 2g, Tris-Base 0.121g, measure ddH_2O and dilute to 100mL.

(6) Preparation of resuspension liquid II

Weigh 1g of BSA, 0.121g of Tris-Base, 1g of sucrose, measure 0.5mL Tween-20, and measure ddH_2O to a constant volume of 100mL

(7) Preparation of physiological saline

Weigh 0.85g of NaCl, measure ddH_2O and dilute to 100mL.

2.4.2 Calibration of minimum protein content by visual inspection

Take 10mL of colloidal gold and adjust the pH to 8.2 with 0.1mol/L Na_2CO_3.

Take a 96-well plate, add 100 microliters of the

above colloidal gold to two rows of wells, add six holes in each row, and add 5 microliters of water, 4 microliters of water and 1 microliter of antibody to the first four wells (concentration 1 Mg/μl), 3 μl water and 2 μl antibody and 5 μl antibody. The last two wells are negative control wells and no antibody is added. Mix and let it stand at room temperature for 10-15 minutes. Then add 10 uL of 10% NaCl solution to the first five wells of each column. Mix and leave at room temperature for 10 minutes. Observe the color change of colloidal gold and record the lowest antibody concentration that remains red. After 2 hours at room temperature, record the lowest antibody concentration that remains red.

2.4.3 Preparation of IgG-Gold

Take 1mL of colloidal gold solution with pH=8.2 (pH has been adjusted), and add 50 micrograms of antibody protein dropwise. Mix well and place at room temperature for 15 minutes. Then add 100 μl of 10% BSA to the colloidal gold solution so that the final concentration of BSA in the colloidal gold solution is 1%. After standing at room temperature for 15 minutes, centrifuge at 10,000 rpm for 20 minutes, and gently aspirate the supernatant. Suspend with 1 mL of Resuspension I, and centrifuge at 4°C at 10,000 rpm for 30 min. Gently aspirate the supernatant, suspend the pellet with 20 μl of Resuspension Solution II, and store at 4°C for later use.

3. Results and analysis

3.1 Results of agarose gel electrophoresis

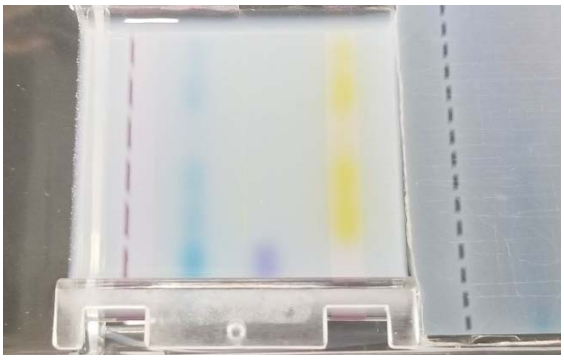

Figure 1. Test result (1).

The results of agarose gel electrophoresis measured under the UV instrument are shown in the figure. Compared with the marker, it can be seen that the DNA fragments are between 500-750bp, indicating that the target DNA fragments amplified by PCR are pure and correct. After the gel is recovered, the result of DNA electrophoresis on the recovered gel is shown on the right. The DNA electrophoresis path can be clearly seen, and the electrophoresis result is excellent.

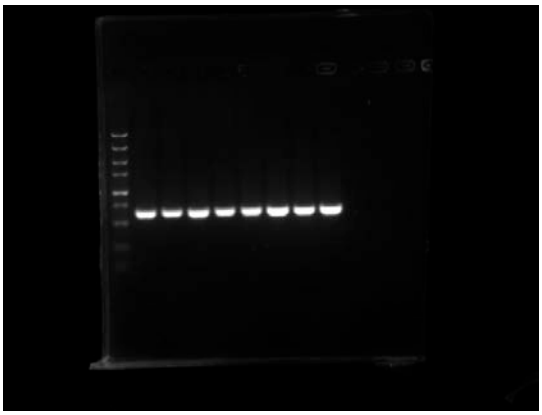

Figure 2. Test result (2).

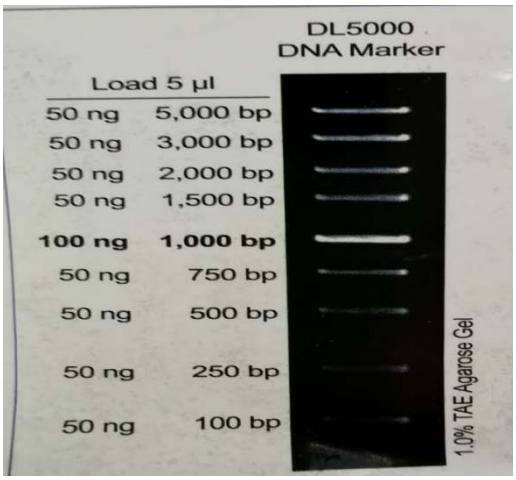

Figure 3. Test result (3).

3.2 SDS-PAGE results

The protein in the figure is relatively aggregated, has no tailing phenomenon, and has high purity, which can be used for further coupling.

3.3 Preparation and quality monitoring results of colloidal gold

The prepared colloidal gold solution was transparent and clarified wine-red color, with gold particles floating on the solution. Obvious light movement paths can be seen through the penetration and irradiation of the laser pointer, and it can be seen that the quality of colloidal gold is good.

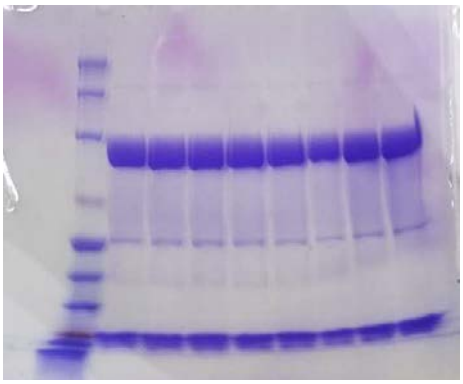

Figure 4. Test result (4).

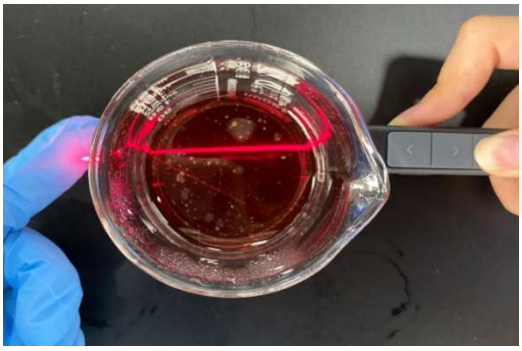

Figure 5. Test result (5).

3.4 Measurement results of minimum protein concentration

In this experiment, the protection test of colloidal gold with different concentration gradients of protein in salt solution is shown in the figure. It is found that 0-2 μg/ml cannot stabilize the colloidal gold, and the coagulation phenomenon from red to blue appears, from 5 μg/ml. Starting from milliliter, the color of colloidal gold is basically stable and consistent, and the optimal protein concentration is 5 μg/ml.

Table 3. Sample and absorbancy

Sample	Absorbancy
Water	0.000A
0	0.003A
1	0.006A
2	0.009A
5	0.029A
+NaCl	0.006A
-NaCl	0.044A

4. Summary of the deficiencies of the experiment and future prospects

4.1 Improvement of experimental procedures

In the preparation of 2.3 colloidal gold, we used manual stirring throughout the process, which could not reach the ideal stirring rate of 300 rpm[3]. We hope that we can change to magnetic stirring in subsequent improvements, so that the prepared colloidal gold may be even better. For high quality, the particle size is more uniform. In addition, the surface of the colloidal gold we made still has oily suspended matter, which requires more filtration to make it more pure. And we need colloidal gold prepared in cold storage.

When determining the minimum antibody content in 2.4.2, we thought that the set concentration gradient was not enough, and the minimum antibody content should be greater than 0.05 μg/μl. However, due to material limitations, we could not continue to subdivide. In our subsequent experiments, A concentration gradient with a smaller minimum division value and a larger maximum measurement value should be set. For example, the difference in antibody content in adjacent wells is 0.005 μg/μl, and the highest antibody content is at 0.1 μg/μl. We think this is the determination. The value that comes out is more reasonable and more accurate.

4.2 Innovations and future prospects

This kit is an in vitro rapid detection kit for the new coronavirus. Although similar kits have appeared on the market, the indirect method for IgM antibody detection is adopted[4]. This kit uses immunochromatographic detection of IgG antibodies, which is the first innovation. As the human body's first response antibody, IgG has a faster response rate than IgM and a higher detection rate. It is more suitable for testing patients who have just been infected with nCOVID-19.

However, as a rapid detection kit, this product still has the disadvantage of relying on the antigen concentration in the sample. When the concentration is less than 10 ng, the product will still show negative, but the tester may still have new coronary pneumonia. Therefore, we hope to add a water-absorbent pad between the sample pad and the colloidal gold pad, with a layer of permeable membrane on it, so that water can penetrate but the antigen cannot, thus concentrating the antigen to improve

accuracy. In order to ensure that the chromatography can still be performed, it is necessary to design the amount of water that the absorbent pad can absorb and the amount of sample dripping.

Fast mass production and low price will be the advantages of this product. At the same time, its fast detection speed and high sensitivity will also become major advantages to improve market competitiveness.

At the same time, we believe that colloidal gold technology should not only be limited to virus detection, but can also be applied to pesticide residue detection, water pollution monitoring, etc., but all this still requires follow-up research and observation. We hope that this emerging labeling method can be applied to a wider field.

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ORIGINAL ARTICLE

Application Effect of Limited Fluid Resuscitation in Emergency Patients with Multiple Trauma Complicated with Shock

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Abstract: This article explores the methods and effects of limited fluid resuscitation in the treatment of hemorrhagic shock caused by multiple trauma, which is common in clinic. 80 patients with multiple trauma complicated with shock were randomly selected from the emergency department of our hospital and divided into the observation group and the control group, with 40 members in each group. Patients in the observation group were treated with limited fluid resuscitation, while those in the control group were treated with aggressive fluid resuscitation. By comparing the therapeutic effects of the two groups, it is concluded that the therapeutic effect of the observation group is significantly better than that of the control group. Therefore, adopting limited fluid resuscitation in the clinical treatment of patients with multiple trauma complicated with shock can realize faster recovery, as well as protect patients' coagulation function, effectively reducing complications and mortality. Moreover, it can also reduce the injury of trauma perfusion to the body, ensuring the recovery of patients.

Keywords: Limited Fluid Resuscitation; Application in Emergency Treatment; Recovery

1. Introduction

Multiple trauma is a common severe illness in clinic. Once onset, it is prone to cause shock and may lead to the failure of some internal organs or cause acute respiratory distress syndrome, resulting in the death of patients. Hemorrhagic shock caused by multiple trauma is even common in the world.

According to relevant reports, about 2 million patients die from hemorrhagic shock every year around the world, among which 1.6 million die from hemorrhagic shock caused by multiple trauma. Experts in this field pointed out in 2017 that there were two main treatments for hemorrhagic shock caused by multiple trauma. One is to control bleeding, and the other is to restore perfusion. Timely bleeding control and professional fluid resuscitation in clinical practice are the key methods to rescue patients with hemorrhagic shock caused by multiple trauma, which can greatly improve the therapeutic effect[1].

2. Materials and methods

2.1 General information

80 patients with multiple trauma complicated with hemorrhagic shock were randomly selected from the emergency department of our hospital from June 2019 to December 2019, and were divided into the observation group and the control group. The observation group consisted of 25 males and 15 females, aged from 15 to 70 years, with an average age of (38.25 ± 23.78) years. There were 23 males and 17 females in the control group, who were aged from 18 to 65 years, with an average age of (40.26 ± 23.18) years. The differences of patients' age and sex in the observation group and the control group have no statistical significance (P is greater than 0.05).

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Collect the general information such as the name, gender and age of the patients in both groups, and compare the treatment effects under limited fluid resuscitation and aggressive fluid resuscitation respectively, and analyze the differences between them[2].

2.2 Research methods

(1) The emergency department of our hospital set up a reatment project group for treating patients with multiple trauma complicated with shock, and designed a statistical scale to compare the therapeutic effects of patients under different treatment methods. Then, medical statistics and analysis were carried out[3].

(2) Collect the general information of the two groups of patients, including their names, ages and genders, and make statistics on the emergency treatment of these patients for clinical analysis and comparison.

2.3 Treatment methods

Patients in the observation group and the control group were examined after admission, and were given basic rescue methods such as opening venous access, stopping bleeding and relieving pain. At the same time, routine laboratory examination was carried out on the patients, and according to the examination results, it was determined whether the patients were seriously ill and needed immediate surgical treatment. Patients in the observation group were treated with limited fluid resuscitation: limiting infusion volume and infusion speed, and maintaining their systolic blood pressure at 70–90 mmHg, and maintaining the average arterial pressure at 50–70 mmHg. Patients in the control group were treated with aggressive fluid resuscitation: giving a large amount of rapid fluid supplement to them to keep their blood pressure level at 80–120 mmHg. While given recovery rescue, the two groups of patients should be treated with surgery as soon as possible to save their lives[4].

2.4 Observing indexes

(1) Serum lactic acid and coagulation function

3ml of patients' peripheral blood were collected before and after 3 hours of fluid resuscitation treatment. The amount of serum lactic acid were detected by colorimetry[5].

(2) Inflammation

Serum interleukin and tumor necrosis factor in patients' blood before and after 3 hours of treatment with means of enzyme-linked immunosorbent assay.

(3) Rescue effect

Medical statistics were made on the mortality rate of patients in the observation group and the control group, together with multiple organ failure and acute respiratory distress syndrome in 3 hours after rescue operation.

2.5 Statistical processing

Medical data were statistically processed by software, items denoting the statistical data, carrying out test, and percentage % denoting the counting data. The P-value less than 0.05 is statistically significant [6].

3. Results

(1) Statistics results on the effects of different fluid resuscitation in the two groups are shown in **Table 1**.

(2) Statistics results of complications and mortality of the two groups of patients under different fluid resuscitation are shown in **Table 2**.

Table 1. Comparison of resuscitation effects between two groups after resuscitation with different fluids (Mean ± SD)

Group	Cases	Average recovery time (min)	Liquid perfusion per capita (mL)	Mean arterial pressure (mmHg)	Mean prothrombin time (s)	Activated partial thromboplastin time (s)
Observation group	40	82.57 ± 22.63	1,489 ± 197	56.24 ± 4.93	14.02 ± 1.36	36.28 ± 3.85
Control group	40	129.35 ± 27.68	2,006 ± 236	75.89 ± 7.97	17.23 ± 1.77	46.92 ± 3.58
T		12.298	10.606	12.891	10.639	15.207
P		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 2. Complications and mortality

Group	Cases	Respiratory distress	Complication: Inflammation	Acute renal failure	Death
Observation group	40	3	2	1	3
Control group	40	9	8	6	11
X^2		4.917	4.462	3.989	6.845
P		< 0.05	< 0.05	< 0.05	< 0.05

4. Discussion

Clinical statistics indicate that about 700,000 people die from multiple trauma every year in China. Because of various forms of trauma, the patient may suffer from shock caused by excessive blood loss, which greatly increasing the probability of death. Multiple trauma complicated with shock are mainly caused by the decrease of blood circulation in the patient's body in a short period of time, which leads to ischemic injury of some important organs including heart, liver and kidney, resulting in organ failure and death. According to the traditional treatment concept, for treating patients with multiple trauma complicated with shock, it is necessary to establish venous channels and add fluid in time in order to restore normal blood circulation and ensure blood irrigation and oxygen supply of important organs. However, this treatment can easily lead to insufficient al blood perfusion, increasing the burden on visceral organs, leading to ineffective treatment and even threatening the life of patients[7].

Researches in recent years have shown that the most important thing to rescue patients with hemorrhagic shock is to stop bleeding quickly, and at the same time, to carry out appropriate fluid resuscitation according to the blood pressure of patients, so as to keep the arterial pressure in a stable state, minimize the damage to important organs of patients, thus improving the therapeutic effect.

A "golden hour" rapid treatment plan has been proposed by clinical experts to treat patients with multiple injuries complicated with shock, which has been recognized by the medical community. A large amount of clinical practices have proved that the therapeutic goal of limited fluid resuscitation is to find a proper way for patients' resuscitation, that is, to improve the blood irrigation of important organs without affecting the compensatory mechanism and visceral organs of patients. It has effectively improved the rescue effect.

Serum lactic acid is the best index to monitor the shock of patients, directly reflecting the anaerobic metabolism of patients, the low irrigation of blood circulation in various organs and tissues, and the shock caused by blood loss. It can effectively predict the therapeutic effect and mortality of patients. According to relevant medical reports, the standard value of the serum lactic acid is 2 nunol/L. If this index of the patient can return to normal within one day, the survival rate is 100%, followed by 80% of survival rate if the value returns to normal within one to two days, the survival rate is 15%[8].

Monokines (TNF-a) are involved in multiple physiological and pathological processes of patients, and they can activate the coagulation system in patients and accelerate the release of thrombopoietic-stimulating factor and prostaglandin. When the patient suffers from blood perfusion injury due to hemorrhagic shock, it will cause a large increase in inflammatory factors, aggravate organ damage and increase the mortality.

Our clinical medical research indicates that the levels of serum lactic acid, interleukin-6 and monokines in the observation group are lower than those in the control group after 3 hours of limited fluid resuscitation, while international normalized ratio (INR) and activated partial thromboplastin time (APTT) were shorter than those in the control group. According to the clinical results, using limited fluid resuscitation to treat patients with multiple trauma complicated with shock can obviously reduce the serum lactic acid level, the inflammatory factors, and shorten the prothrombin time and activated partial prothrombin time, further improving the coagulation function of patients, improving the therapeutic effect, and increasing the survival probability of patients[9].

Limited fluid resuscitation is also a kind of hypotension fluid resuscitation, that is, to control the speed of fluid input reasonably when the patient is in hemorrhagic shock due to trauma, so that the blood pressure can be

controlled in a small range until the blood stops completely. In addition, the blood will not be excessively diluted due to a large amount of liquid supplementation in the rescue process, and the accumulation and the oxygen content of red blood cells can be effectively improved[10].

Furthermore, the above treatment can quickly restore the myocardial oxygen supply speed of patients, accelerate the blood supply to the heart, relieve the clinical symptoms, improve the rescue effect, and greatly increase the survival rate of patients. Researches have pointed out that limited fluid resuscitation can greatly shorten the recovery time of patients' physical mechanism, reduce the amount of fluid input, adjust the coagulation function of patients, improve their immune mechanism and increase the survival rate.

In this clinical investigation, the incidence rates of respiratory distress, inflammatory reaction and acute renal insufficiency in the observation group were 8.2%, 5.1% and 2.7% respectively, while the figures in the control group were 23.1%, 21.2% and 15.3% respectively. The mortality rate of the observation group was 6.9%, and that of the control group was 26.7%. respectively. Therefore, limited fluid resuscitation has better treatment effect than aggressive fluid resuscitation in reducing complications and mortality.

5. Conclusion

To sum up, limited fluid resuscitation has better effect than general fluid resuscitation in rescuing patients with multiple trauma and shock. That is because the former can greatly reduce the serum lactic acid level of patients, effectively reduce inflammatory factors, and enable patients to recover their physical mechanisms in a short period of time. It can increase their chances of survival, and ensure their life safety, making it a highly reliable treatment method that can be widely applied in clinical emergency treatment.

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ORIGINAL ARTICLE

Effect of Cefazolin Sodium on Perioperative Prophylactic Anti-Infection in Patients Undergoing Gynecological Surgery

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Abstract: Purpose: The purpose is to investigate the effect of cefazolin sodium on perioperative prophylactic anti-infection in patients undergoing gynecological surgery. Methods: 112 cases of gynecological surgery from January 2019 to April 2020 were divided into the control group and the observation group, with 56 cases in each group. They were given cefazolin sodium + metronidazole and cefazolin sodium monotherapy respectively. The perioperative white blood cells and the incidence of adverse reactions of the two groups were compared. Results: There was no difference in the normal rate of white blood cell count between the observation group and the control group ($P > 0.05$), and no adverse reaction in the observation group, which was significantly lower than 7.14% in the control group ($P < 0.05$). Conclusion: the use of cefazolin sodium in perioperative period of gynecological surgery can prevent infection, with advanced security, less adverse reactions and high value.

Keywords: Cefazolin Sodium; Gynecological Surgery; Perioperative Period; Preventive Anti Infection

1. Introduction

Studies have shown that patients after gynecological surgery are mainly faced with postoperative infection and other problems, which belong to the high incidence of perioperative complications. If they cannot be prevented and controlled in time, it will lead to poor wound healing, prolong the recovery time of the disease, and cause serious symptoms and even death by infection, so it is necessary to prevent anti-infection of gynecological surgery patients during perioperative period[1]. At present, there are many drugs for postoperative infection in clinic, and cefazolin sodium belongs to a wide range of drugs, which has a positive inhibitory effect on Gram-positive bacteria and less adverse reactions. However, at present, most of them are used in combination with metronidazole, it can better control the infection to a certain extent, but the adverse reactions after metronidazole use are serious, so we consider the use of cefazolin sodium single drug control method to observe the curative effect[2]. In this paper, the effect of cefazolin sodium on perioperative prophylactic anti infection in patients undergoing gynecological surgery is analyzed and discussed.

2. Data and methods

2.1 General information

During January 2019 to April 2020, 112 cases of gynecological surgery were divided into control group and observation group, with 56 cases in each group. The control group was in 28-68 years old, with the average age of (48.11 ± 5.78) years old; the observation group was in 26-68 years old, with the average age of (47.76 ± 5.54) years old. There was no statistical significance between the two groups ($P > 0.05$)

Inclusive indicators: 1) all patients underwent gyne-

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cological surgery smoothly without abnormality; 2) the experimental scheme was approved by the hospital ethics committee; 3) the patients agreed to the experiment and signed the consent form.

Exclusion criteria: 1) previous allergic history of cephalosporins and metronidazole; 2) infection before operation; 3) no complete clinical data; 4) mental diseases; 5) blood diseases.

2.2 Method

In the control group, cefazolin sodium and metronidazole were given 30 minutes before the operation. Cefazolin sodium (Huabei pharmaceutical, Hebei Huamin pharmaceutical, Guoyao Zhunzi h13020668) was given intravenously at a dose of 2.0 g, while metronidazole (Nanjing Zhengda Tianqing Pharmaceutical Co., Ltd., Guoyao Zhunzi h20023747) was given intravenously at a dose of 0.5 g. The drug should be given within 30 minutes; After operation, 4.0g cefazolin sodium and 1.0g metronidazole were given intravenously twice a day for 24-48h.

The observation group was treated with cefazolin sodium monotherapy, and the same dosage of 2.0g was given 30 min before the operation, and 4.0g cefazolin sodium was given after the operation. The times and time of administration were the same as those of the control group.

2.3 Observation indexes

The two groups of perioperative white blood cell situation comparison, if the white blood cell count is lower than 10*109/L, it is normal, while higher than 10*109/L, it is abnormal, and then the postoperative white blood cell count is tested. Adverse reactions included nausea and vomiting, headache and vertigo.

2.4 Statistical analysis

The data of each observation index were qualitative data, n (%) was used to represent count data, x^2 refers to test, and ($\bar{x} \pm s$) is used to represent measurement data, t refers to test. After statistical analysis by SPSS22.0 statistical soft package, if the difference is significant and $P < 0.05$, there is statistically significance.

3. Results

3.1 Comparison of white blood cells in two groups during perioperative period

There was no difference in the normal rate of white blood cell count between the observation group and the control group ($P > 0.05$), as shown in **Table 1** below.

3.2 Comparison of the incidence of adverse reactions between the two groups

There was no adverse reaction in the observation group, which was significantly lower than 7.14% in the control group ($P < 0.05$), as shown in **Table 2** below.

Table 1. Comparison of white blood cells in two groups during perioperative period [n (%)]

Group	<10*10^9/L	≥10*10^9/L	≥15*10^9/L
Control group (n=56)	53 (94.64)	2 (3.57)	1 (1.79)
Observation group (n=56)	52 (92.86)	2 (3.57)	2 (3.57)
t	0.152	0.000	0.343
P	0.696	1.000	0.558

Table 2. Comparison of incidence of adverse reactions between the two groups [n (%)]

Group	Nausea and vomiting	Headache	Vertigo	Incidence Rate
Control group (n=56)	2	2	0	4 (7.14)
Observation group (n=56)	0	0	0	0 (0.00)
x^2	--	--	--	4.148
P	--	--	--	0.042

4. Discussions

There is a high probability of infection after gynecological surgery, which is closely related to the anatomical structure of the female reproductive system. The female genital tract is close to the urethra and anus, so it is vulnerable to the invasion of bacteria. Therefore, it is very important to prevent perioperative infection. It is necessary to choose more appropriate and effective postoperative infection suppression measures, apply more effective drugs, and take effective measures, in order to pay attention to the safety of drug use and prevent the adverse reactions of patients after taking[3].

Data comparison showed that there was no difference in the normal rate of white blood cell count between the observation group and the control group ($P > 0.05$), and no adverse reaction in the observation group, which was significantly lower than 7.14% in the control group ($P < 0.05$). The reason is analyzed. Cefazolin sodium is a kind of chelating macromolecule synthesized by cefazolin molecule, sodium ion and water molecule. It is a sort of crystal structure with strong stability, which has more drug effect than common cefazolin and can effectively resist Gram-positive bacteria. Moreover, after administration, the sulfur-containing group can be wrapped into a kind of cavity similar to a tunnel with better stability, which can effectively control its contact with the rubber plug, and the adverse reactions after drug use can be effectively controlled. Therefore, the simple use of drugs can also control the Gram-positive bacteria, playing the effect of drug combination[4]; on the analysis of drug use time, the rationality of preventive medication needs to be guaranteed. Generally speaking, the first 2-3 hours after the end of the operation belongs to the effective period and decision period of infection control.

In this study, 30 minutes before the operation, antibiotics intervention can be carried out at the first time after the incision appears, so as to ensure that the blood in the local tissue contains antibiotics during the incision exposure period. And it can kill the invasive bacteria during the operation to realize the effective control of infection and continuous medication 24-48 hours after the operation. It can continuously control postoperative and prevent possible infection during wound recovery, so that infection control is more ideal after use[5]; according to the analysis of adverse reactions, metronidazole is mainly used for anaerobic infection, but 15-30% of cases have adverse reactions, and the incidence of adverse reactions is higher, so without using the drug, the control effect of adverse reactions is more ideal[6,7].

In conclusion, the use of cefazolin sodium in perioperative period of gynecological surgery can prevent infection, with high security, less adverse reactions and more valuable.

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Universe Scientific Publishing

ORIGINAL ARTICLE

Discussion on the Effect of Introducing Clinical Pharmacists to Guide Clinical Medication in ICU

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Abstract: Objective: to investigate the effect of clinical pharmacists in ICU. Methods: 108 ICU patients from January 2018 to March 2020 were divided into the control group and the observation group, with 54 cases in each group. The control group used the previous medication route, while the observation group introduced clinical pharmacists to guide clinical medication. The infection rate and adverse reaction rate of the two groups were compared. Results: the infection rate of the observation group was 3.70%, and that of the control group was 14.81%, which was significantly lower than that of the control group (P<0.05). The adverse reaction rate of the observation group was 5.56%, and that of the control group was 18.52%, which was significantly lower than that of the control group (P<0.05). Conclusion: the introduction of clinical pharmacists to guide clinical medication in ICU can effectively control the infection, and reduce various adverse reactions during drug use, so as to realize the scientific and standardized use of drugs, and improve the efficiency and safety of drug use.

Keywords: ICU; Clinical Pharmacist; Guidance; Clinical Medication; Effect

1. Introduction

ICU is the abbreviation of intensive care unit, which mainly provides effective isolation and treatment places for severe and comatose patients to complete the rescue of patients. Generally speaking, ICU patients have a high degree of disease severity, and the disease changes quickly, so the treatment needs to be very timely and accurate[1]. In the hospital, the clinical drug work is generally in the charge of the hospital pharmacists. Through the communication between pharmacists and doctors, nursing staff and management personnel, the latest drug information is provided for the treatment of patients, the consultation of rational drug use is completed, and the rationality of drug use is improved[2]. However, at present, Chinese pharmacists fail to give full play to their responsibilities, especially, the use of anti-infective drugs leads to the abuse of antibiotics, and increasing the incidence of nosocomial infection, which is more dangerous for ICU patients. Therefore, it is necessary to introduce clinical pharmacists to guide clinical medication and improve the rationality of drug use[3]. This paper analyzes and discusses the effect of clinical pharmacist's guidance in ICU.

2. Data and methods

2.1 General information

108 ICU patients from January 2018 to March 2020 were divided into control group and observation group, with 54 cases in each group. In the control group, the ratio of male to female was 28:26. The lower limit of age was 20 years; the upper limit was 76 years; and the median age was (48.21 ± 4.33) years. There were 14 cases in neurosurgery, 16 cases in general surgery, 18 cases in

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thoracic surgery and 6 cases in orthopedics[4]. In the observation group, the ratio of male to female was 29:25. The lower limit of age was 19 years; the upper limit was 76 years; the median age was (47.86 ± 4.59) years. There were 15 cases in neurosurgery, 14 cases in general surgery, 19 cases in thoracic surgery and 6 cases in orthopedics. There was no significant difference in basic data between the two groups (P > 0.05).

2.2 Method

In the control group, the previous drug management mode was still used. After obtaining the prescription, the drug was reviewed and distributed according to the prescription after it was confirmed to be correct.

The specific measures are as follows: (1) clinical pharmacists need to enter the ICU every day to make rounds with the attending doctors, often make acute inspections on patients and obtain the latest results of patients' examinations. It's necessary to timely judge the abnormality of disease treatment, and whether the patients have bad psychology, if so, it needs actively communicate, give pharmaceutical care, and take good medication, to ensure the standardization of clinical medication. (2) In general, the utilization rate of antibiotics is high in clinic, and the treatment of diseases is mainly anti infection. Pharmacists need to provide reasonable medication suggestions and monitoring points, and pay attention to the standardization of combined medication. If patients are older, they need to consider the age problem, pay attention to the indicators of kidney examination and adjust the drug dose in time, so as to pay attention to control the adverse reactions during the use of drugs, and report and analyze the adverse reactions in time. (3) We should pay attention to the guidance of drug use for nursing staff, and observe whether the administration method of nursing staff is correct. Although comatose patients have difficulty in swallowing, enteric coated drugs can't be taken after crushing, so as to prevent the efficacy from being affected. In severe cases, toxic reactions will occur. Therefore, it is necessary to replace the drugs, so as to provide more targeted drug intervention measures for patients. (4) We should join in the procurement and evaluation of new drugs, establish a patient-centered drug intervention mode, and get in touch with the drug storehouse purchasing personnel to master the clinical feedback of new drugs, so as to make clear the drugs in the hospital, carry out clinical medication guidance with the patient as the center and better realize pharmaceutical care.

2.3 Observation indexes

First, the infection rates of the two groups were analyzed, including pulmonary infection, urinary system infection and respiratory tract infection.

Secondly, the adverse reaction rates of the two groups were analyzed, including diarrhea, nausea and vomiting and stress ulcer.

2.4 Statistical analysis

The data of each observation index were qualitative data; n (%) was used to represent count data, x^2 test; ($\bar{X}$ ± s) was used to represent measurement data, and t means test. After statistical analysis by SPSS22.0 statistical soft package, if the difference was significant and P < 0.05, it was statistically significant.

3. Results

3.1 Analyzing the infection rate of the two groups

The infection rate of the observation group was 3.70%, and that of the control group was 14.81%, which was significantly lower than that of the control group (P < 0.05). See **Table 1** for details.

Table 1. The infection rate of the two groups is analyzed

Group	Pulmonary infection (n)	Urinary tract infection (n)	Respiratory tract infection (n)	Infection rate (%)
Control group (n=54)	2	3	3	14.81
Observation group (n=54)	1	0	1	3.70
x^2	--	--	--	3.967
P	--	--	--	0.046

3.2 The adverse reaction rates of the two groups are analyzed

The adverse reaction rate of the observation group was 5.56%, and that of the control group was 18.52%, which was significantly lower than that of the control group ($P < 0.05$). See **Table 2** for details.

Table 2. Analysis of adverse reaction rate of the two groups

Group	Diarrhea (n)	Nausea and vomiting (n)	Stress ulcer (n)	Infection rate (%)
Control group (n=54)	4	3	3	18.52
Observation group (n=54)	1	1	1	5.56
x^2	--	--	--	4.185
P	--	--	--	0.038

4. Discussion

ICU patients are badly ill, so patients generally need to be combined with drugs. And because the immune system is damaged, leading to a high incidence of infection, so for patients, scientific and reasonable drug use is very important to ensure the safety of drug use[5]. Pharmacists can guide the interaction, contraindications and compatibility of drugs, to improve the rationality of drug use.

According to the data analysis in **Table 1-2** above, the infection rate of the observation group was 3.70%, and that of the control group was 14.81%, which was significantly lower than that of the control group ($P < 0.05$). The adverse reaction rate of the observation group was 5.56%, and that of the control group was 18.52%, which was significantly lower than that of the control group ($P < 0.05$). Analyzing the reasons: clinical pharmacists have rich pharmaceutical knowledge, and can design safer and more reasonable drug treatment plans with doctors[5]. Therefore, pharmacists participating in clinical work can help doctors determine the dosage of drugs and their adverse reactions, and help doctors solve the adverse reactions during drug treatment, so they can control the adverse reactions. After drug intervention, the use of antibiotics can be more standardized, and the treatment of drugs is more targeted, so the control effect of infection is more ideal[6]. Using drug intervention and controlling acid inhibitors at the same time can better adjust the gastric acid and control the incidence of stress ulcer, so drug guidance of clinical medication can give full play to its advantages. They can use their own basic knowledge of medicine, chemistry and drug analysis to choose more standardized drug regimen for patients, and which is conducive to the recovery of ICU patients[7].

In conclusion, the introduction of clinical pharmacists to guide clinical medication in ICU can effectively control infection and reduce various adverse reactions during drug use, so as to achieve scientific and standardized use of drugs and improve drug use efficiency and safety.

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ORIGINAL ARTICLE

Relationship between Ambulatory Pulse Pressure, Pulse Pressure Index and Coronary Artery Disease in Patients with Hypertension

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Abstract: Objective: To analyze the relationship between ambulatory pulse pressure, pulse pressure index, and coronary artery disease in patients with hypertension. Methods: From February 2018 to February 2019, a group of 100 patients with hypertension (control group) and a group of 100 patients with hypertension and coronary artery disease (experimental group) were selected to monitor and analyze dynamic pulse pressure and pulse pressure indicators. Results: In terms of clinical indicators, values of NPPI, 24hPP and 24hPPI in the experimental group were significantly higher than those in the control group. $P < 0.05$ indicates that there is statistical value in the data difference. Conclusion: In the clinical diagnosis of hypertension patients, ambulatory pulse pressure, pulse pressure index are highly correlated with the risk of coronary artery disease. Therefore, researchers should actively pay attention to the relevant indicators of patients to lay a solid foundation for the effective protection of patients' health.

Keywords: Hypertension; Ambulatory Pulse Pressure; Pulse Pressure Index; Coronary Artery Disease

1. Introduction

With the increasing trend of population aging in recent years, the incidence of various cardiovascular diseases has been on the rise, causing harm and threats to people's health. On this issue, some medical researchers pointed out that there is a close correlation between hypertension and coronary heart disease after analyzing research data. Based on this, medical researchers have conducted an in-depth analysis of the correlation between pulse pressure of hypertension patients and coronary heart disease in different periods in order to effectively protect the health of patients with hypertension, thus further realizing a reasonable analysis of health problems and providing help for the prevention of coronary heart disease for hypertension patients. After analyzing a large number of data, researchers pointed out that pulse pressure, as one of the important clinical indexes of human body, is regarded as an important index in the diagnosis of cardiovascular diseases. Therefore, in order to further analyze the relationship between hypertension and coronary heart disease, medical researchers have made studies on pulse pressure of hypertension patients in different periods based on relevant clinical data, aiming at further exploring the relationship between pulse pressure and coronary heart disease, and thus to help hypertensive patients realize reasonable prevention of coronary heart disease effectively. This article explores and analyzes the relevant contents which will be reported as follows.

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2. Materials and methods

2.1 General information

From February 2018 to February 2019, 100 patients with hypertension (control group) and 100 patients with hypertension and coronary heart disease (experimental group) in our hospital were selected as the research samples. There were 60 males and 40 females in the control group, aging from 35 to 71 years old. There were 61 males and 39 females in the experimental group, aging from 37 to 74 years old. The basic data has no statistical value ($P > 0.05$).

2.2 Methods

All patients received ambulatory blood pressure monitor for their blood pressure indicators, and the monitor equipment is Spacelabs90217. All patients took safety test of related equipment between 8: 00 and 10: 00 a.m. In this process, medical staff helped patients to tie the cuff of the equipment to the left upper arm and adjust the parameters of the equipment to ensure that the reasonable measurement of the patient's pulse pressure index can be effectively collected during the period from 6: 00 to 22: 00 and from 22: 00 to 6: 00 of the next day, providing corresponding data for the development and implementation of the follow-up research work. During blood pressure dynamic monitoring, medical staff should guide patients to avoid strenuous exercise to effectively realize the reasonable measurement of accurate blood pressure value, which provides guarantee for the next progress of monitoring work. At the same time, medical personnel should actively inform the monitoring instructions to ensure that patients do not use electronic devices, such as mobile phones, computers and tablets, in order to avoid the influence of electronic products on equipment during ambulatory blood pressure monitoring. In this period, medical personnel should actively and reasonably answer the related questions raised by patients, and effectively solve patient's questions, so as to lay a solid foundation and guarantee for the smooth development of the clinical diagnosis and treatment.

2.3 Observation indicators

In this study, the patients' night pulse pressure index (NPPI), 24-hour pulse pressure (24hPP) and 24-hour dynamic pulse pressure index (24hPPI) were taken as important monitoring indexes. Moreover, medical researchers should compare and analyze the ROC curves of patients with different indexes to provide corresponding guidance for the follow-up research work.

2.4 Statistical method

In this study, the statistical software SPSS20.0 is selected for data calculation, in which ($\bar{x}$ s) stands for measurement data, t test% stands for counting data, and X^2 test. For data differences, $p < 0.05$ indicates that there is statistical value.

3. Results

3.1 Comparisons of monitoring data

In terms of clinical indicators, the values of NPPI, 24hPP and 24hPPI in the experimental group are significantly higher than those in the control group. $P < 0.05$ indicates that there is statistical value. Detailed data refer to **Table 1**.

Table 1. Pulse pressure and pulse pressure index of patient

Group	n	NPPI	24Hpp (mmHg)	24hPPI
Experimental group	100	0.45±0.08	50.57±1.43	0.42±0.03
Control group	100	0.37±0.06	46.01±1.51	0.38±0.02
t	-	8.000	21.927	11.094
P	-	<0.05	<0.05	<0.05

3.2 Logistic regression model analysis

According to the analysis of ROC curve, areas under ROC curve of NPPI and 24hPPI in hypertension patients with coronary heart disease are 0.68 and 0.66 respectively, larger than those under ROC curve of 24h PP. Related figure is presented as follows.

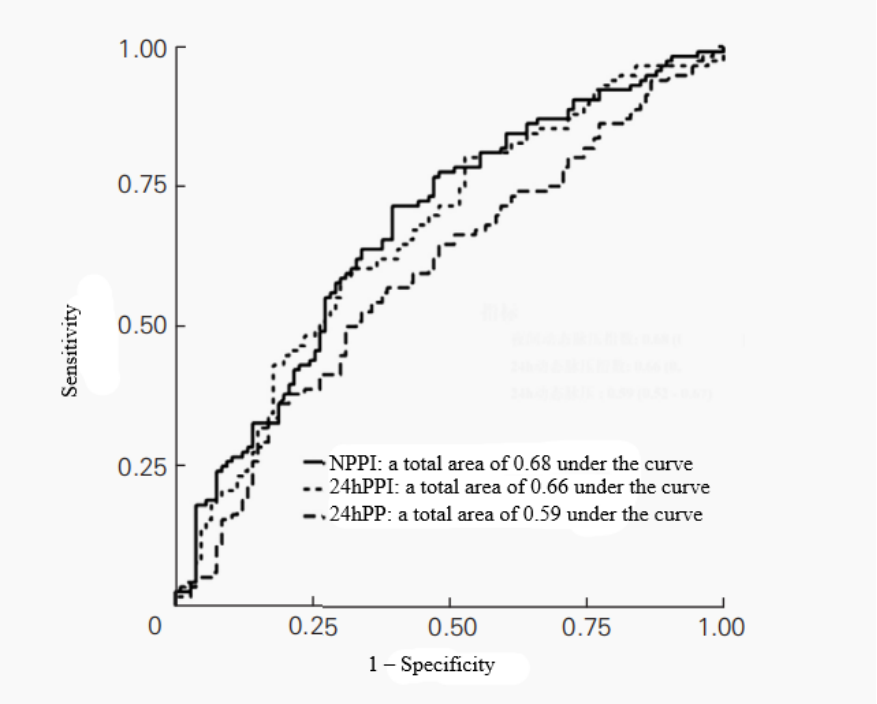

Figure 1. ROC curve**.**

4. Discussion

In clinical process, hypertension patients with coronary heart disease, are common in clinic treatment. Medical researchers pointed out that such situation often do extremely harm to patients' health, which will make the treatment more difficult and complicated. Particularly, as one of common diseases, hypertension can seriously affect the blood pressure index of patients, which leads to a significant increase in systolic blood pressure and diastolic blood pressure. If it cannot be controlled effectively in time, the excessive blood pressure will cause huge extra burden on the blood vessels of patients. It will also lead to an increasing trend of cardiovascular accidents and increasing the risk of coronary heart disease, which are extremely unfavorable to the health of patients. On this issue, researchers analyzed a large number of data and pointed out that the pulse pressure index of hypertension patients is relatively high, which can also be used as a predictor of coronary heart disease patients. Therefore, medical researchers should actively pay reasonable attention to the pulse pressure and pulse pressure index of hypertension patients, in order to effectively realize the reasonable prevention of coronary heart disease in hypertension patients in the nursing process. In such cases, they can analyze the probability of coronary heart disease according to relevant indicators and effectively realize relevant nursing intervention and drug application for the reasonably prevention of coronary heart disease. Besides, relevant data show that for hypertension patients' vascular elasticity may be weakened due to the influence of abnormal blood pressure. This problem can lead to a trend of greatly weakening the role of vascular elastic reservoir in patients' whole body, which is not conducive to the protection of patients' health. Based on this, the PP and PPI indicators can show a trend of substantial increase. In clinical process, data obtained by ambulatory blood pressure monitoring is more accurate, which can avoid uncertain factors effectively of occasional blood pressure measurement, so as to help medical researchers to further realize reasonable understandings of the patient's blood pressure, which have important significance and value for the follow-up diagnosis and treatment work. In terms of application value, a large number of data show that NPPI and 24hPPI have better predictive value for patients with coronary heart disease and have a good guiding role for maintenance of patients' health. Regarding related problems, through the development and implementation of related research work, a large number of clinical data show that medical

researchers can effectively analyze the risk of coronary heart disease in patients with hypertension, which has a good promoting significance and guiding role for the reasonable protection of people's health in China.

This study showed that the NPPI, 24hPP and 24hPPI of hypertension patients with coronary heart disease were significantly higher than those of patients with hypertension alone. In the process of clinical diagnosis, the areas under ROC curve of NPPI and 24hPPI are larger than 24hPP, which proves that NPPI and 24hPPI have good application value in predicting coronary heart disease.

To sum up, during the clinical diagnosis of hypertension patients, dynamic pulse pressure and pulse pressure index have a highly relation with the risk of coronary heart disease. Therefore, researchers should actively pay attention to the relevant indicators of patients to lay a solid foundation for the effective protection of patients' health.

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ORIGINAL ARTICLE

Application of Microscrew Implant Anchorage in Orthodontics

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Abstract: Objective: To study the value of microscrew implant anchorage in orthodontic treatment. Methods: A total of 80 cases received orthodontic treatment in recent two years were selected and divided into experimental group and control group based on their received orthodontic measures, each group contains 40 cases. The control group was treated with general orthodontic treatment plan, while the study group received microscrew implant anchorage for the treatment. The clinical conditions of the two groups were counted and observed. Results: After different treatments, the effect of the study group was significantly better than that of the control group. All the indicators (including the improvement of molar displacement, incisor inclination angle and incisor convex distance) were available. In addition, there are obvious differences between the two groups in the occurrence of adverse reactions including inflammatory reaction, soft tissue edema and discomfort. Conclusion: In oral clinic, microscrew implant anchorage can achieve ideal curative effect for those who need orthodontics. Besides, its safety is relatively high, which is worth popularizing widely.

Keywords: Orthodontics; Microscrew Implant Anchorage; Safety

1. Introduction

In stomatological clinic, orthodontic intervention is also called orthodontics, a common treatment method adopted by the department of stomatology. Good orthodontic intervention can improve recessive diseases to a great extent, and can also effectively clean teeth and beautify faces[1]. In traditional orthodontic treatment, most use external arch or transverse palatal bar. There are many reports of adverse reactions in clinic. In recent years, with the development and progress of stomatology, microscrew implant anchorage (hereinafter referred to as microscrew) has been widely recognized, and its application prospect is also ideal[2]. In this research, orthodontic effect of microscrew implant anchorage is studied in the following contents.

2. Data and methods

2.1 General information

A total of 80 cases who received orthodontics in recent two years (December 2018 to May 2020) were selected. Due to symptoms such as dental caries, swollen gums, loose teeth, all of the cases went to see doctors. Participations in this research have ruled out the special circumstances, such as unconsciousness, unwillingness to cooperate with the study, and major organic diseases. Experimental group and control group were divided according to the orthodontic treatment measures. Each group contains 40 cases: the study group covers 25 males and 15 females, aged from 22 to 39 years old; while the control group included 24 males and 16 females, aged from 23 to 40. There is no significant difference in general data. The research conforms to ethical standards and it can be carried out.

2.2 Methods

General anchorage treatment was given to the control group Microscrews were given about 8 weeks before the tooth extraction gap was closed. Firstly, lidocaine

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(2%) was taken for local anesthesia, and then a longitudinal gingival margin between the roots of the maxillary first molars and second canines. A micro-screw implant was then placed in the left and right sides respectively. After implantation, a load pressure of about 5g-200g was applied between the implant nail, the maxillary and mandibular arch wire traction hooks at the time points of 2 weeks, 4 weeks and 8 weeks. Patients were instructed to make regular follow-up visits. At the same time, repeated stress was applied with reference to the closure of the patient's tooth gap until the tooth extraction gap was completely closed.

The experimental group received microscrew implant anchorage, which covered cleaning the periodontal tissues of patients. Cavities were filled in time for treatment if they were found. If there were other oral diseases, they needed to be timely treated to avoid burying orthodontic risks. In such methods, it is necessary to select straight wire arch metal bracket orthosis, to adjust the upper teeth and lower teeth of the case to be flush, to adduce the whole teeth by sliding stainless steel wire, and to close the extraction gap at the same time. During the treatment, patients should use anchorage devices correctly, and strengthen traction with extraoral arch and traction technique to ensure traction intervention for about 10 hours to 12 hours every day.

In addition to the treatment above, adjuvant treatment and nursing measures received by the two groups were completely the same.

2.3 Clinical observation indicators

Referring to the head X-ray lateral scan films of the two group's cases, the clinical prognosis was compared and observed to count and observe the clinical efficacy. In addition, according to the investigation of patients' clinical manifestations and complaints, the adverse reactions after receiving intervention were determined. Specifically, clinical observation indicators mainly cover the following two aspects.

The first, clinical indicators include the improvement of molar displacement, incisor inclination angle and incisor convex distance.

The second, adverse reactions include inflammatory reaction, soft tissue edema, discomfort (chief complaint).

2.4 Statistical methods

Referring to the data requirements put forward in the observation index, statistical software is selected to process the data. The counting data involving probability and percentage are expressed by (probability/%) and confirmed by the line. The measurement data involving variables are expressed by (quantitative variables) and tested. The statistical results show that the P value is below 0.05, which means the difference is significant.

3. Results

Clinical efficacy of 2.180 cases refers to **Table 1**.

Adverse reactions of 2.280 cases refer to **Table 2**.

Table 1. Comparative analysis of clinical efficacy of the 80 cases

Group	**Molar displacement (unit: mm)**	**Inclination angle of incisors decreases (unit: °)**	**Decreased incisor pitch (unit: mm)**
Experimental group (n=40)	3.24±0.19	29.31±7.02	4.31±1.65
Control group (n=40)	5.23±0.69	13.24±4.57	2.74±0.84
T value	17.586	12.133	5.363
P value			

Table 2. Comparative analysis of adverse reactions in the 80 cases

Group	**Inflammatory lesions**	**Significant discomfort**	**Soft tissue edema**
Experimental group (n=40)	1 (2.50%)	1 (2.50%)	0
Control group (n=40)	4 (10.00%)	3 (7.50%)	1 (2.50%)
Chi-square value	4.114		
P value	0.043		

4. Discussion

Most common cases requiring orthodontics include mesioclusion, convexity, malposition of teeth, etc., in medical clinic. Most of the deformities are caused by patients' daily diet, breathing style, congenital heredity and other factors. If treatment is not given in time, there will be great hidden dangers that will lead to loose teeth and slurred speech[3]. In addition, it requires more difficult techniques for oral deformity to clean oral cavity, which could increase the risk of alveolar bone and soft tissue damages, and then affects the normal chewing function[4]. Therefore, increasingly clinical medical workers and researchers pay attention to how to apply orthodontic intervention correctly in clinic.

In this study, the positive effects of microscrew implant anchorage on orthodontic patients were analyzed. Compared with the control group, patients in the experimental group showed obvious advantages in both clinical efficacy and the probability of adverse reactions. The latter was significantly lower in the experimental group. This achievement is reliable, which has also been confirmed in Huang Shanxia's[5] and Sun Yuchao's works[6].

The overall control quality of anchorage is generally the key in orthodontics. It is also a key prerequisite to ensure the successful completion of treatment. On the whole, extraoral arch and maxillofacial traction are traditional orthodontic anchorage control methods, and the treatment effect is ideal. However, due to its long time-consuming cycle, complicated practical operation, unstable reduction effect, high probability of patients complaining of discomfort and other problems, its clinical application is controversial. Besides, this method demands a high degree of cooperation from patients, which directly determines whether the treatment effect meets the clinical needs. During the recovery of front teeth, there is a close relationship between the anchorage teeth and facial bones, jaws and muscles, which is very easy to induce serious anchorage teeth loosening problems[7].

The stability and resistance of microscrew implant anchorage are both ideal and clinic. This method can adjust the facial morphology of patients, to a great extent. In addition, patients will experience less foreign feelings and can adapt to it after having been placed for two weeks. Patients do not need to cooperate actively during operation. When the anchorage is implemented, it does not need the guidance of bone bricks. With the help of the rotation of threaded nails, it can smoothly enter the bone and be fixed with good mechanical strength, greatly reducing time for osseointegration[8]. During the treatment, new bones can provide good support and overall stability for implants. Indications of micro-screw anchorage implants are extensive, which needs to be mastered in clinical practice. Besides, attentions need to be paid to contraindications, such as anchorage molar advancement and periodontitis[9]. When choosing the position of implant, doctors should try to make a comprehensive evaluation with reference to the patient's age, anchorage demand, bone cortex thickness and bone morphology in the implantation area, in order to improve clinical adaptability[10].

5. Conclusion

In summary, microscrew implant anchorage can achieve ideal curative effect and relatively high safety for patients who need orthodontic treatment. It is worthy of in-depth clinical practice and extensive theoretical research in oral clinic to bring convenience to more patients who need orthodontic treatment.

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