EFFECTS OF XUEBIJING COMBINED WITH ANTIBIOTICS ON TH CELL SUBGROUP, OXYGENATION INDEX AND SEROLOGICAL INDEXES IN PATIENTS WITH AN ABDOMINAL INFECTION

YING GUO*, RUILIAN MA[1], LINLIN PAN[2], JIALI GAO[1,*]
[1]Department of Pharmacy, Affiliated Hospital of Inner Mongolia Medical University, No. 1 Tongdao North Road, Huimin District, Hohhot City, Inner Mongolia, 010050, China - [2]Department of Trauma Orthopedics, The Second Affiliated Hospital of Inner Mongolia Medical University, No. 1 Yingfang Road, Huimin District, Hohhot City, Inner Mongolia, 010030, China

ABSTRACT

Objective: *To investigate the effect of a combination of xuebijing and antibiotics on Th cell subgroup, oxygenation index (OI) and serological indexes in patients with an abdominal infection.*

Methods: *There were 56 patients with severe abdominal infection admitted and diagnosed in our hospital from December 2015 to December 2017 who were randomly divided into the control group (ceftriaxone sodium) and the study group (xuebijing injection combined with antibiotics), with 28 cases each. The clinical efficacy, adverse reactions and oxygenation index of the two groups were observed by tracking changes to vital signs including systolic blood pressure (SBP), body temperature, respiratory rate, diastolic blood pressure (DBP) and heart rate. The changes of blood routine and blood biochemical indexes in the two groups were observed, including haemoglobin (Hb), leukocytes (WBC), platelets (PLT), procalcitonin (PCT), C-reactive protein (CRP) and lactic acid (LA). The levels of Th cell subsets (CD3+, CD4+, CD4+/CD8+) in the two groups were also observed.*

Results: *The total effective rate in the study group (92.86%) was significantly higher than the results in the control group (67.86%), and the difference was statistically significant (P<0.05). There was no significant difference in the incidence of adverse reactions between the two groups (P>0.05). After treatment, heart rate, respiratory rate, body temperature, SBP, CD3+ value, CD4+ value, CD4+/CD8+ value, OI, WBC, CRP, PCT, LA, Hb, PLT in the two groups were statistically significant (P<0.05). After treatment, the values of CD3+, CD4+, CD4+/CD8+ and OI in the study group were significantly higher than those in the control group (P<0.05). After treatment, heart rate, body temperature, WBC, CRP and PCT of the study group were significantly lower than those of the control group (P<0.05).*

Conclusion: *A combination of xuebijing and antibiotics to treat an intraperitoneal infection can safely improve the oxygenation index, immune levels, and serological index of patients.*

Keywords: *Xuebijing, antibiotics, abdominal infection, Th cell subgroup, oxygenation index, serological indicators.*

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Introduction

Infection refers to the condition of local tissue and a systemic inflammatory reaction caused by the invasion of bacteria, viruses, fungi and other pathogenic microorganisms into the human body. An abdominal infection refers to a series of infectious diseases of the abdominal cavity, including infection of single abdominal organs, peritonitis and abdominal abscess[1-2]. Due to different infection sites and development process, the clinical manifestations of an abdominal infection are also different but are mainly manifested as nausea, vomiting, fever, diarrhoea, abdominal pain, abdominal muscle tension, etc.[3]. Coeliac infection is a common immune disease that impacts the gastrointestinal (GI) tract. As it progresses, a coeliac condition may even be accompanied by organ failure, seriously affecting people's lives[4]. Some studies have found that xuebijing combined with antibiotics can significantly shorten the treatment time and enhance the treatment effect for GI conditions. Xuebijing is a commonly used traditional Chinese medical preparation in clinical practice, which can activate blood circulation, remove blood stasis, clear the veins and eliminate endotoxins[5]. Combined with antibiotics, it plays an important role in preventing multiple organ failure caused by endogenous inflammatory mediators and improving prognosis[6]. At present, the anti-inflammatory effect of xuebijing combined with antibiot-

ics in the treatment of patients with an abdominal infection has been clearly defined, but there are few reports on the influence of it on Th cell subsets, oxygenation index and serological indexes of patients. In this study, xuebijing combined with antibiotics was used in the treatment of patients with abdominal infection, aiming to explore its influence on Th cell subsets, oxygenation index and serological indexes, which are reported as follows.

Materials and methods

General Information

Approved by the ethics committee of our hospital, 56 patients with abdominal infection admitted and diagnosed in our hospital from December 2015 to December 2017 were selected.

Inclusion criteria comprised:

• Aged between 21and 78 years;

• Two or more organ and system function damage;

• The constitution is not allergic;

• Normal liver function;

• All patients and their families signed the informed consent.

Exclusion criteria included:

• Age less than 21 years old or more than 78 years old;

• Comorbidity with hepatitis B, AIDS and other infectious diseases;

• The treatment of intolerance;

• Combined with renal failure or severe mental illness.

The 56 patients were randomly divided into a study group (n=28) and control group (n=28). The control group included 11 males and 17 females, with an average age of (42.37±11.32) years. There was no significant difference in gender and age between the two groups, which were comparable.

Treatment Methods

After admission, the patients in the two groups were given nutritional support, hydrolysis was corrected according to their conditions, blood sugar was controlled, stress ulcer was prevented, ventilation and catheterisation were assisted when necessary, and vital signs were monitored regularly. The control group was given antibiotics [intravenous infusion of 2 g ceftriaxone sodium (North China Pharmaceutical Hebei Huamin Medicine Co., Ltd.., batch number: 20155219, specification: 1.0g)] once a day. The study group was given antibiotics combined with xuebijing injection (Tianjin Chase Sun Pharmaceutical Co., Ltd., production batch no.: 20150033, specification: 10ml), and an intravenous infusion of 50ml normal saline 100ml twice a day. The treatment effect was observed for seven consecutive days.

Criteria

There were three possible outcomes. First, the symptoms and signs of fever and peritoneal irritation disappeared completely. Second, the symptoms and signs of fever and peritoneal irritation were partially improved and the results of laboratory examination were obviously improved. Finally, the patient still had a fever, peritoneal irritation and other symptoms and signs, and the laboratory examination results showed no significant changes were invalid. Total effective rate = (recovery + improvement)/ total cases *100%.

Observation Indexes and Detection Methods

The clinical symptoms, signs, adverse reactions, systolic blood pressure (SBP), body temperature, respiratory rate, diastolic blood pressure (DBP) and heart rate were compared between the two groups. For 24 h before treatment was initiated and for the treatment cycle of 7 d the team would extract 3 ml of fasting venous blood. The serum from both groups of patients was treated with 3,000 r/min, separated by a centrifuge and stored at -80 °C for later use. Haemoglobin (Hb), white blood cells (WBC) and platelets (PLT) were detected by an automatic blood cell analyser. Procalcitonin (PCT) was detected by electrochemical luminescence. C-reactive protein (CRP) level was detected by immune-enhanced turbidimetry. An enzyme chromogenic method was used to detect lactic acid, LA levels; and Th cell subsets, including $CD3^+$, $CD4^+$, $CD4^+/CD8^+$, were detected by flow cytometry. The arterial partial pressure of oxygen (PaO_2), inhaled oxygen fraction (FiO_2), and oxygenation index (OI) $=PaO_2/FiO_2$ were determined by the automatic biochemical analyser.

Statistical Methods

Spss23.0 statistical software was used to analyse the data in this study. Clinical efficacy and adverse reactions of patients in the two groups were compared by χ^2 test, and changes in SBP, body temperature, respiratory rate, diastolic blood pressure (DBP), heart rate, Hb, WBC, PLT, PCT, CRP, LA, PaO_2, FiO_2 and Th cell subsets $CD3^+$, $CD4^+$, and $CD4^+/CD8^+$ were compared by t-test. $P<0.05$ indicated that the difference was statistically significant.

Results

Clinical Efficacy of the Two Groups

In the control group, eight cases were cured (28.57%) and 11 cases were improved (39.29%) so that 19 cases were deemed effective (67.86%) while nine cases were ineffective (32.14%). In the study group, 14 cases were cured (50.00%) and 12 cases were improved (42.86%) so that 26 cases were effective (92.86%) while two cases were ineffective (7.14%). The total effective rate in the study group was significantly higher than that in the control group, and the difference was statistically significant (P<0.05), as shown in Table 1.

Groups	n	Recovery	Improvement	Ineffective	Total Effective Rate
Control Group	28	8(28.57%)	11(39.29%)	9(32.14%)	19(67.86%)
Research Group	28	14(50.00%)	12(42.86%)	2(7.14%)	26(92.86%)
c^2	/	/	/	/	4.073
P	/	/	/	/	0.044

Table. 1: Clinical efficacy of patients in the two groups (n, %).

Comparison of Vital Signs between the Two Groups

After treatment, the differences in heart rate, respiratory rate, body temperature and SBP between the two groups were statistically significant (P<0.05). Results showed that the heart rate and body temperature in the study group were significantly lower than those in the control group, with statistically significant differences (P<0.05), as shown in Table 2.

Groups	Time	Temperature (°C)	Blood Pressure /mmhg		Respiratory Rate/(Min^{-1})	Heart Rate/(Min^{-1})
			SBP	DBP		
Control Group (n=28)	Before Treatment	39.01±0.69	86.49±11.56	68.18±6.74	24.54±4.15	102.66±6.43
	After Treatment	37.52±0.49*	107.77±12.55*	72.68±5.53	17.99±2.53*	80.9±7.12*
Research Group (n=28)	Before Treatment	38.79±0.77	87.09±11.44	68.68±5.83	25.36±4.53	102.98±6.72
	After Treatment	36.78±0.55*#	115.66±13.57*	73.49±5.36	16.77±2.38*	73.45±5.87*#

Table. 2: Comparison of vital signs between the two groups ($\bar{x}\pm s$).
*Note: compared with the group before treatment, *P<0.05. Compared with the control group after treatment, the #P<0.05.*

Comparison of Th Cell Subsets between the Two Groups

After treatment, the values of $CD3^+$, $CD4^+$ and $CD4^+/CD8^+$ in the two groups were statistically significant (P<0.05). After treatment, $CD3^+$, $CD4^+$ and $CD4^+/CD8^+$ values in the study group were significantly higher than those in the control group, with statistically significant differences (P<0.05), as shown in Table 3.

Groups	Time	$CD3^+$	$CD4^+$	$CD4^+/CD8^+$
Research Group (n=28)	Before Treatment	52.43±5.13	26.37±3.66	0.98±0.16
	After Treatment	72.48±6.39*	37.38±5.48*	1.73±0.24*
Control Group (n=28)	Before Treatment	52.47±5.58	26.43±3.48	1.02±0.17
	After Treatment	61.53±6.44*#	33.46±5.63*#	1.35±0.21*#

Table. 3: Comparison of Th lymphocyte subsets between the two groups (%, $\bar{x}\pm s$).
*Note: compared with the group before treatment, *P<0.05. Compared with the post-treatment study group, the #P<0.05.*

Comparison of Oxygenation Index (OI) between the Two Groups

After treatment, there were statistically significant differences in OI between the two groups (P<0.05). After treatment, OI in the study group was significantly higher than that in the control group, and the difference was statistically significant (P<0.05), as shown in Table 4.

Groups	Time	OI (mmol/L)
Research Group (n=28)	Before Treatment	170.58±47.33
	After Treatment	202.83±40.78*#
Control Group (n=28)	Before Treatment	171.24±39.97
	After Treatment	269.33±52.29*

Table. 4: Comparison of OI values between the two groups ($\bar{x}\pm s$).
*Note: compared with the group before treatment, *P<0.05. Compared with the post-treatment study group, the #P<0.05.*

Comparison of Blood Routine and Blood Biochemical Indexes between the Two Groups

After treatment, WBC, CRP, PCT, LA, Hb and PLT of the two groups were statistically significant (P<0.05). After treatment, WBC, CRP and PCT in the study group were significantly different from those in the control group (P<0.05), as shown in Table 5.

Groups	Time	Hb/(g·L^{-1})	WBC/ (10^9·L^{-1})	PLT/ (10^9·L^{-1})	CRP/ (mg·L^{-1})	PCT/ (ng·L^{-1})	LA/ (mmol·L^{-1})
Research Group (n=28)	Before Treatment	94.78±7.55	23.88±2.99	104.65±41.45	20.87±1.91	3.29±0.48	3.98±0.44
	After Treatment	111.64±8.84*	12.87±1.88*	224.56±67.42*	12.16±1.52*	0.46±0.09*	2.22±0.25*
Control Group (n=28)	Before Treatment	93.45±6.77	24.09±3.59	109.01±35.65	21.33±2.62	3.17±0.59	4.05±0.49
	After Treatment	114.66±7.85*	10.22±1.76*#	237.11±59.91*	8.67±1.41*#	0.11±0.11*#	2.09±0.32*

Table. 5: Comparison of blood routine and blood biochemical indexes between the two groups (n=28, $\bar{x}\pm s$).
*Note: compared with the group before treatment, *P<0.05. Compared with the control group after treatment, the #P<0.05.*

Adverse Reactions in the Two Groups

In the control group, one patient had drowsiness, one patient had diarrhoea, one patient had mild jaundice, so five patients (17.86%) had total adverse reactions. In the study group, there were two cases of sleepiness, one case of diarrhoea, one case of mild jaundice, and three cases of total adverse reactions (10.71%). There was no statistically significant difference in the incidence of adverse reactions between the two groups (P>0.05), as shown in Table 6.

Groups	drowsiness	diarrhoea	mild jaundice	total adverse reactions
Control Group (n=28)	2	2	1	5(17.86%)
Research Group (n=28)	1	1	1	3(10.71%)
χ^2	/	/	/	0.146
P	/	/	/	0.703

Table. 6: Comparison of adverse reactions between the two groups (n, %).

Discussion

Coeliac infection refers to the intraperitoneal infection caused by pathogens such as enterococcus and bacillus, which is common after surgery. At present, the main method of treatment of an abdominal cavity infection after surgery is with antibiotics, but this is not ideal because the long-term use of antibiotics can lead to drug-resistant bacteria and antibiotics can release a large number of endotoxins causing systemic inflammatory response syndrome (SIRS) in the process of destroying gram-negative bacillus. Therefore, the search for more effective drugs to treat an abdominal infection has become the focus of clinical attention. According to relevant reports, a xuebijing injection can significantly reduce the expression of serum endotoxin and inflammatory factors in patients with an abdominal infection, improve the body's immunity and limit abdominal infection. A xuebijing injection is mainly composed of Chinese herbs such as safflower, angelica root, red peony root, ligusticum chuanxiong and salvia miltiorrhiza. Safflower can promote blood circulation, disperse blood stasis and relieve pain, improve the body environment and enhance the phagocytic function of macrophages. Angelica sinensis plays an important role in anti-cancer and immunity improvement, inhibiting tissue oedema and granulation tissue hyperplasia caused by inflammation[9]. Red peony root has the effect of clearing heat, cooling blood, removing blood stasis and relieving pain, and can enhance the body immunity. When used together with salvia miltiorrhiza, rhizoma chuanxiong has significant effects in protecting endothelial vascular cells and inhibiting platelet aggregation[10]. The combination of the above five herbs can fundamentally cure diseases[11]. This research study provided a net injection with antibiotic treatment in patients with an abdominal cavity infection and found that the research group's total effective rate (92.86%) was significantly higher than the control group (67.86%). Neither group had significant adverse reactions[12]. Other studies showed similar results and further illustrate how a net injection combined with antibiotics provides a curative effect for the treatment of an abdominal cavity infection.

PCT is a protein that reflects the active level of the systemic inflammatory response[13], which plays an important role in the progression and prognosis of severe inflammatory diseases such as SIRS, sepsis, multi-organ dysfunction syndrome (MODS), and peritonitis. At the same time, studies have found that CRP is an important indicator reflecting the degree of inflammation and the concentration of CRP in the serum of healthy people is very low, but it can be rapidly increased during acute infection and tissue injury. Deng Y C's study found[14] that in patients with severe pneumonia, patients with elevated CRP had a poor prognosis. This study showed that the levels of CRP and PCT in the two groups after treatment were significantly lower than those before treatment, and the levels of CRP and PCT in the study group were significantly lower than those in the control group during the same period. It is suggested that the combination of xuebijing injection and antibiotics in the treatment of abdominal infection can help to reduce the CRP and PCT levels of patients and control the inflammatory factors closer to the normal level. Blood cell data can reflect the condition of health and the illness progress many diseases. In this study, Hb, WBC and PLT were significantly improved in both groups, and the improvement degree in the study group was better than that in the control group.

Oxygenation index (OI) can reflect the oxygenation status of the body, and its normal value is 400-500mmhg, and OI<300mmhg indicates pulmonary respiratory dysfunction[15]. In this study, OI was significantly higher in the two groups after treatment and OI was significantly higher in the

study group than in the control group. It has been suggested that a xuebijing injection combined with antibiotics in the treatment of abdominal infection is helpful to improve lung function. Some scholars pointed out that the increase of LA level can be seen in bacterial meningitis, sepsis, tuberculous meningitis, cerebral ischemia and other diseases. Lactic acid (LA) has a normal value<2.8mmol/L In this study, it was found that xuebijing injection combined with antibiotics in the treatment of abdominal infection helped to reduce the level of LA.

The occurrence of an infection is mainly related to the decline of immune function in the body and the most common is the suppression of t-lymphocyte-mediated cellular immune function. $CD3^+$ is a protein complex that binds to a T-cell antigen receptor (TCR) via a salt bridge and is involved in T cell signal transduction. $CD4^+$ II boosts the helper T lymphocytes. $CD8^+$ is a cytotoxic T cell subgroup with killing effects on target cells and tumour cells infected by intracellular parasites such as viruses[16]. Some scholars have also pointed out[17] that $CD8^+$ can inhibit the function of B lymphocytes, thus inhibiting the production of antibodies. Normal $CD4^+/CD8^+$ ratio is a prerequisite for normal immune function. This study found that the values of $CD3^+$, $CD4^+$, $CD4^+/CD8^+$ in the two groups after treatment were significantly higher than those before treatment in this group, and the values of $CD3^+$, $CD4^+$, and $CD4^+/CD8^+$ in the study group were significantly higher than those in the control group. Therefore, immune regulation can be used to improve the cellular immune status of the body during infection, so as to alleviate the symptoms of infection.

In conclusion, the combination of xuebijing injection and antibiotics in the treatment of intraperitoneal infection can improve the oxygenation index and immune levels, improve patients' serological indexes, and are safe.

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Corresponding Author:
Jiali Gao
Email: a44kxh@163.com
(China)