The Observations of Cytokines and Coagulation for Patients after Operation of Peripherally Inserted Central Catheter

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Abstract: Fifty cancer, blood disease and non-cancer patients after operation of peripherally inserted central catheter were observed to analyze TNF-α, IL-6, IL-10, blood coagulation in blood which may correlated with the formation of venous thrombosis. Basically, for TNF-α and IL-6 by radioimmunoassay, IL-10 by enzyme-linked immunosorbent assay and the blood coagulation by automatic coagulation instrument were measured in plasma. The experimental results revealed that operation of peripherally inserted central catheter may cause inflammatory cytokines in plasma levels of TNF-α increased and levels of IL-6 decrease. It also anticipate the possibility of the formation of venous thrombosis.

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Introduction

PICC (Peripherally inserted central catheter) is basically a safe, low cost and less causing side-effect skill of making a central venous pathway for patients [1]. In China, this skill was imported from USA in the year around 1990 and widely used for patients [2]. However, the side effect of causing of thrombosis by inflammatory stimulation of the venous wall, high blood coagulation for cancer patients, drug adhesion and bad sealing of the catheter is becoming serious concerned. Clinic experimental evidences have shown that the variation of the inflammatory cell factor highly correlates to the blood thrombosis [3]. We have tested seven indicators including TNF-α、IL-6、IL-10, plasma prothrombin time (PT), international standardization ratio (INR), activation part blood coagulation time (APTT) live enzyme, thrombin time (TT) and plasma fibrinogen (FIB) to recognize the difference between the patient and normal person. The experimental results revealed the high correlation for all indicators with blood thrombosis.

Method

Eighty eight patients with and without PICC were selected as statistical samples for analysis from February to September 2009. According to the disease catalogue, it was divided into four groups. The records of 38 healthy people were used as control. Records of 20 not cancer patients were used as on experimental group I. Cancer patients with PICC were in group II. 16 Hematological patients were in group III. Meanwhile, in group I, there were three subgroups were considered, two patients for esophageal carcinoma subgroup, five for lung cancer and three for gastric cancer patients. The materials for PICC were not found any significant difference. The blood samples from the vein were taken for all patients and the agreement following the experimental standards were signed. All the inflammatory factors TNF-α、IL-6、IL-10 and four indexes of blood coagulation were tested including PT, APTT, FIB and TT.

The regular method of RIA for checking the levels of TNF、IL-6 and ELLSA for testing IL-10 were performed as well as using auto blood coagulation instruments to test the blood coagulation. The steps are all referred to the instruction guide.SPSS17 were used for statistical analysis at $\alpha = 0.05$.

Experimental Results

The test result of PT、APTT、FIB、TT and control for PICC with non cancer patients (group I) is listed in Table 1. The *p*values are.136、0.866、0.127、0.451，respectively ($p>0.05$) (Table 1).

Other tests for PICC patients and control are listed in Table 2. Comparitively, least square anaysis is performed. For test of TNF-α, p is equal to $0.000<0.01$ for group II icomparied with control, $p=0.002<0.01$ for group I compared with control，$p=0.007<0.01$ for group III compared with control. For test of IL-6, p

=0.000<0.01 for group II icomparied with control, *p* =0.000<0.01 for group I comparied with control，*p* =0.000<0.01 for group III compared with control. However, for test of IL-10, no significant difference was observed (Table 2).

Table 1. PICC test result-group I（±s）

	n（samples）	PT	APTT	FIB	TT
PICC group I	20	11.85±1.43	31.68±4.75	4.01±1.83	18.34±3.45
control	38	10.97±0.69	30.76±3.68	3.28±1.02	18.29±1.61

note：* *p*<0.05， ** *p*<0.01

Table 2. Test Results of TNF-α、IL-6、IL-10 and controlfor of PICC (±s）

	n（samples）	TNF-α	IL-6	IL-10
Group I	20	0.85±0.25▲	97.09±44.39▲	0.20±0.40
Group II	14	1.07±0.38▲	76.10±32.51▲	0.19±0.04
Group III	16	0.82±0.23▲	128.13±50.70▲	0.21±0.10
Control	35	0.61±0.25	207.04±124.86	0.32±0.64

note：n comparison with non-PICC patients, significant difference is demonstrated

Discussion

PICC to the clinical treatment of intravenous infusion bring great convenience, but also appeared to phlebitis, venous thrombosis mainly of a series of complications, which reported the incidence of venous thrombosis have very different at home and abroad, mainly in the 1.9% volatility between ~ 38.0% [6-9]. PICC operator's Dongzuoguoda injury in vein; catheter as a foreign body floating in the blood vessels within the movement; catheter tip to the vessel wall to stimulate; treatment of drug stimulation; patients after catheter tube side of the body over activities, will directly or indirectly caused by stimulation of vein wall intimal response to local inflammation, causing the release of inflammatory cytokines, resulting in inflammatory cytokines in the blood increased.

Vein thrombosis is an acute non-suppurative venous inflammation and thrombosis associated with secondary disease [10]. Cancer patients in a hypercoagulable state itself, the endogenous synthesis of tumor cells and mononuclear macrophages can lead to anti-tumor effects of tissue factor in the increase of TNF-α, activates prothrombin directly involved in venous thrombosis [5]. IL-6 is a multifunctional inflammatory cytokine, is a key component of the network of inflammatory mediators in the inflammatory response play an important role. As a long-term anti-inflammatory cytokine or cytokines may be a balance of proinflammatory cytokines or the damaging effects of early cytokines, play a protective role [11]. PICC in this study three groups of serum TNF-α compared with the control group, respectively, higher than average, and the difference was statistically significant (p <0.01); of PICC three groups of serum IL-6, respectively, compared with the control group, lower than the mean PICC group, and the difference was significant (p <0.01). TNF-α and IL-6 level changes, suggesting that catheter and vein wall inflammation have great relevance.

Studies have shown [12], hypercoagulable state in cancer patients can lead to self-vein thrombosis, blood, often accompanied by a series of patients with a coagulopathy [13], FIB prothrombotic state as molecular markers, their levels easy marks the occurrence of thrombosis or thrombosis. Disease, cancer and blood disease itself may affect the value of the significance of coagulation. The coagulation Africa mean tumor group compared with the control group, although both were no significant differences between the results (p> 0.05), but higher than the mean, indicating that PICC catheter for non-cancer patients have increased Four levels of clotting tendency, but the effect was not significant; PICC also shows that the main factors in patients with thrombosis may be caused by vein catheterization inflammatory response, rather than a direct impact on blood viscosity, but still needs further experimental studies are needed to confirm this.

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