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# Method of Preoperative Blood-control for Aortic Dissection Aneurysm

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## Abstract

Preoperative care for arterial aneurysm in aortic dissection (AD) may prevent the AD from breaking and expanding, thereby creating opportunities for endovascular repair. The goal of making sufficient preparation for the intraluminal stent implantation was realized through retrospective analysis of 40 patients with AD hospitalized from January 2011 to December 2014, as well as with caring measures like preoperative close observation of blood pressure, reasonable usage of hypotensor, pain relief nursing care, and control of the disease's progress. Notably, not a single death occurred before the operation. Therefore, accurate evaluation of blood pressure, continuous control of the usage of hypotensor with an intravenous injection pump, close observation of the disease, and avoidance of various dangerous factors before endovascular repair for AD may enable the patients to safely pass through the dangerous preoperative phase and have the opportunity for the operation.

**Keywords** Arterial aneurysm, Aortic dissection, Endovascular repair, Preoperative

## Background

Arterial aneurysm in aortic dissection (AD) is the dissecting hematoma formed by the blood within the aortic lumen entering the medial layer. AD is characterized by aortic wall cystic degeneration through the broken intimal tear, which gradually expands within the medial layer of the aorta, driven by the pressure of the blood flow so as to achieve the dissociation of the medial layer of the aorta. One research study has shown that 50% of AD patients died within 48 hours

and the major reason for death at the early stage is the broken tumor or the occlusion of arterial blood supply to important areas like the coronary artery, brachiocephalic trunk, or visceral arteries<sup>[1]</sup>. If patients could be treated appropriately within the acute phase, stable circulation could effectively help them pass through this dangerous period. Below is a summary of the experiences of caring for the 35 patients with AD, hospitalized from January 2011 to December 2014.

## Materials and methods

### 1. General materials

We hospitalized 40 patients with arterial aneurysm in aortic (AD) dissection from January 2011 to December 2014, among which there were 30 males and 10 females at ages ranging from 40 to 82 with an average age of  $(50.5 \pm 12.5)$ . All of the patients began with symptoms of sudden pain in the chest, waist, and back and had hypertension history. Magnetic resonance angiography (MRA), CT, and artery angiography were conducted to confirm the diagnoses that 15 cases were Stanford A typed AD, while 25 were Stanford B typed AD; 30 cases were acute (the onset time  $\leq 14$  days) AD, while 10 cases were chronic.

### 2. Selected device

Endovascular membrane-covered stent implantation was

conducted on all 40 cases, which had used the Talent membrane-covered stent (made by the US Medtronic Company) at the diameter of 34–42mm and the length of the membrane stent as 30~150mm.

### 3. Observation and care

#### 3.1 Blood pressure monitoring

The aortic dissection may affect the aorta as well as its branches in different parts of the body to different degrees; therefore, the blood pressure in the four limbs may have large distinctions. When the patients were hospitalized, the arteriopalmses at the distal ends of the four limbs of each patient were touched, the blood pressures of the four limbs were measured, the status of blood supply and blood pressure of the four limbs of each patient was figured out, and whether the arteries in

the four limbs was evaluated. The position for measuring the central arterial pressure was confirmed according to the results of the measurements, thus having avoided the illusion of hypotension resulting from only measuring the upper limbs of the involved arteries, which can mislead the diagnosis, treatment, and drug administration by doctors. As to the blood pressures of both upper limbs, the side with the higher measured value was taken as the fixed blood pressure for measuring the limbs. Eleven patients in this group had a blood pressure difference between the limbs of  $\geq 10$ mmHg, and 3 patients had a difference of  $\geq 20$ mmHg of the systolic pressure between ankle and arm.

### 3.2 Caring with hypotensor

The average blood pressure of the patients at hospitalization was 130~218/82~120mmHg, the systolic pressure was  $154.90 \pm 14.36$ mmHg, the diastolic pressure was  $90 \pm 8.52$ mmHg, and the heart rate was 90~140 / min with an average value of  $102 \pm 20.86$ /min. The goal of controlling blood pressure was 100~120mmHg, which was an ideal value [6]. Fifteen patients had intravenous nitroglycerin, 12 patients had intravenous sodium nitroprusside, while 8 patients had intravenous Ebrantil, all were combined with the administration of hypotensor. Nitroglycerin was used for three to five days but the effect of depressurization was not so good, so five patients were changed to sodium nitroprusside and another three patients to Ebrantil. All medication administration was conducted through continuous intravenous injection pumps controlling the input, which began with a small dosage, and regulated according to the status of blood pressure so as to quickly and stably

reduce blood pressure. During the process of the drug administration, blood pressure was measured once 10 to 30 minutes at the beginning, and after the blood pressure became stable, it was measured once 30 to 60 minutes later. Hypotensors were continuously pumped into the veins, and the key point of care laid in the avoidance of sudden stoppage, which could lead to the sudden rebounding of the blood pressure, thus resulting in danger.

During care, it should be specially noted: ① that the point of injection should not be on the limbs where the blood pressure is measured because the repetitive pressure from the blood pressure cuff could block the drug from entering the body; ② if there is needle jam or phenomena like redness, swelling, or pain on the intended injection site, the position for injection should be changed immediately; ③ that other drug fluids should not use the same channel used for the injection of hypotensors; ④ when replacing drug fluid, it needs to be prepared in advance so as to ensure timely and continuous connection; ⑤ that the injection extension tube should be changed every day so as to prevent the blockage of the filtration membrane, which could hinder the drug fluid from entering the body.

During the process of injecting sodium nitroprusside, the blood pressure of one patient in this group had risen from 128/65mmHg to 150/70mmHg, but the needle was not jammed after examination. Then the drug fluid was adjusted from 5ml/h to 7ml/h, and the blood pressure measure at the point of the third minute was 180/90mmHg, indicating a dangerous emergency. The running of the injection pump was examined but no abnormality was identified, and at that time the blood

pressure was still rising, so the injection pump, the drug fluid, and the extension pump were changed emergently, resulting in the blood pressure being controlled and gradually reduced to the target value. The original devices were dismantled and after careful examination it was found that the filtration membrane was blocked but the injection pump did not give alarm signals. The occurrence of this circumstance was very dangerous and it was not appropriate to spend more time to identify the abnormality; instead, nothing but the emergent changing of the whole set of devices was the essential for saving the patient's life.

### 3.3 Caring for pain

Pain is the prominent and characterizational symptom of this disease. During the acute period the pain is serious, continuous, and even unbearable, accompanied by pale complexion and cold sweat. Sharp pain may make the blood pressure rise, lead to horror, and deteriorate the disease. According to the evaluation on the degrees and positions of the patients' pain, the position of the pain may indicate the position of the torn wound. Pain in the chest, laryngeal area, jaw, neck, or face indicates the dissection of the ascending aorta, while pain on the back, abdomen, or lower limbs indicated the dissection of the descending aorta. In this group, 32 patients had severe pain, among these patients, 75~100mg of pethidine hydrochloride was injected into 25 patients and 100mg of Tramadol was injected into 7 patients according to the prescription of the doctors; 8 patients had medium pain, who took 100mg of Tramadol orally twice daily and then felt relieved pain or even fell asleep. If after the relief, pain takes place repetitively; it indicates that the

separation of the dissection continues to expand, while if the pain deteriorates suddenly, it tends to indicate that the AD has broken. So pain needs close observation and emergent treatment measures should be taken actively.

### 3.4 Observation of the symptoms of the affected organ

Because the branches of aorta were pressed by the dissecting hematoma or the endomembrane was torn, the openings were blocked or absent, and the affected organs had insufficient supply of arteries, corresponding symptoms sometimes arose. Once an abnormality was identified, it was reported to the doctors immediately, and the conditions of the disease were determined in combination with corresponding auxiliary examinations. The patients in this group all had clear consciousness, among whom 17 patients had slight headaches during the process of the treatment, which might be related to hypotensors. Seven patients in the group had bated pulses on the left radial artery with left upper limb numbness, and 4 patients had bated pulse on the right radial artery with right upper limb numbness and the temperature lower than the opposite side, which were treated by being kept warm and protected from being crushed. Five patients had 600~800ml as 24h urine amount, which were increased by intravenous injections at the rate of 10~20mg. Ten patients had chest pain with arrhythmia, and 5 patients had EDGs indicating changes in the ST section.

### 3.5 Early surgical nursing

In order to insure good results for the intraluminal stent implantation for the patients of Stanford Type



A and prevent the stent membrane from blocking the collateral vessels so as to hinder the blood supply of other organs, the patients need to conduct the operation of the first phase. In this group, the membrane wound of the Stanford type A was close to the unknown artery and the left common carotid artery. Five patients first had artificial blood vessel bypass through the left subclavian artery to the left common carotid artery and then to the right common carotid artery, five to seven days after which, intraluminal stent implantation was conducted again. After the artificial blood vessel bypass, dissecting aneurysm and its danger still exist. In the meantime, when preventing the breaking and expansion of dissecting aneurysm, observation and care should be conducted after the artificial blood vessel bypass, so as to observe the post-operative complications like bleeding of the wound, false aneurysm caused by anastomotic leakage, hematoma adjacent to the wound oppressing the trachea and leading to breathing difficulties, headache, dizziness, and status of brain blood supply. Antibacterial was applied as prescribed by the doctors so as to prevent infection of the wound and artificial blood vessels, thus smoothly transiting the patient into the next phase for conducting intraluminal stent implantation. In this group of 5 patients, 3 had errhysis on the wound, which were all light red and at the amount of about 10 to 15ml; after changing the drugs two to three times no errhysis was seen. Two patients had subcutaneous ecchymosis at the size of about 3×5cm, which did not provide a feeling of volatility or beating when being touched, so the possibility of hematoma formation and pseudo aneurysms was excluded. It was observed that no ecchymosis had been expanded, which might be related to the injury

caused by the operation and the use of low molecular heparin after the operation. No hematoma or pseudo aneurysms had been found before the intraluminal stent implantation.

### 3.6 Avoidance of dangerous inducement

There had been some research showing that most of patients who died before the operation died from the rupture of aneurysms induced by putting forth efforts after coughing, eating, defecation, etc [2]. Therefore, patients should absolutely lie on the bed for rest after being hospitalized and should be minimally transferred or moved. As much as possible, regular examinations before the operation such as ECG, chest radiography, and B ultrasound should be conducted at the patient's bedside.

Mental care should be given so as to relieve the nervous or fearful feelings to prevent the rising of blood pressure caused by nervous emotion. Attention should be paid to keeping the patient warm in order to prevent the patient from getting cold or cough. Once symptoms like cough or expectoration are identified, the patient should be told not to pull up strength for coughing, and in the meanwhile, drugs for relieving cough and reducing sputum should be administered to the patient. Instructions should be given on caccation on the bed and laxative or enema may be used to maintain the easiness and smoothness of defecation. Food should be fed to the patient while lying on the bed, which for this study was mainly spoon meat. Sedative should be applied to patients who have dysphoria so as to reduce the inducements for breaking the aneurysm in aortic dissection.

## Discussion

AD usually has extensive scope of lesions, and the patients with acute AD may die suddenly or within several hours or days. Endovascular repair is the primary method for treatment of AD, and it has advantages like safety, minor wounds, quick recovery, small numbers of complications, and lower mortality [3]. Endovascular repair still needs a period for preparation from the hospitalization of the patient and having the procedure. This is an extremely dangerous period for patients with an acute occurrence of the disease and has a high mortality. Active treatment, close observation, and diligent care could render the patients able to safely pass through this dangerous period and render them eligible for endovascular repair.

Hypertension is the most important dangerous factor for aortic dissection. In order to control the blood pressure at an ideal level and reduce fluctuation, the observation of blood pressure and care with hypotensors could play very important roles. In order to determine the differences among the blood pressures of the four limbs, the absolute difference value  $\geq 10$ mmHg between the blood pressure of the left arm and that of the right arm has been taken as the standard for diagnosing the differences of the blood pressures between the two arms. The difference value between the systolic pressure at the ankle and that of the arm, which is  $\geq 20$ mmHg, and the differences between the diastolic pressures at the ankle and that of the arm, which is  $\geq 10$ mmHg are taken as the standard for the diagnosis of the differences between the blood pressures at the ankle and that of the arm [4].

The adjustment of the hypotensor is based on the central

blood pressure within the body. The clinical application of hypotensor would usually encounter various obstacles blocking the hypotensors from entering the body, causing the blood pressure to rise quickly, uncontrolled by the drug. This is extremely dangerous [5].

Considerations should be conducted on many organs and in many aspects for observing the disease, and emergency should be dealt with in emergent methods. There are also reports on special cases like acute cerebral infarction caused by arterial aneurysm in aortic dissection [6], pain in chest and breathing difficulty caused by AD oppressing the right main pulmonary artery [7], and aortic dissection mainly manifested as functional disturbance of extremities [8], etc. Emergent changes of disease during the period of hospitalization will not be excluded, so it needs close observation. Lumen isolation combined with artificial vascular bypass surgery is a kind of safe and effective treating method for Stanford A-typed AD. It is better to conduct intraluminal stent implantation five to seven days after the by-pass operation so as to prevent the occurrence of stomal leak [9].

Caring before and after the artificial vascular bypass surgery must not be ignored. Because the arterial aneurysm in aortic dissection still exists, so it is not appropriate to do much functional exercise or rehabilitation exercise on neck after the first phase of the operation, and the patient still needs to lie on bed for rest, protect the wound, control blood pressure, conduct sedation-analgesia to appropriate degree, increase nutrition, and promote the healing of the wounds so as to smoothly transit to the next phase of the operation. Pain is the dangerous signal for further deterioration or development of the disease, and effective controlling

on the pain could reduce the risk of broken arterial aneurysm. The medical staffs should be capable of predicting risks of other potential dangerous factors so as to avoid possible inducement and reduce the risk of inducing arterial aneurysm to a minimum degree.

The dangerous factors before the operation on AD lie in unstable blood pressure, which leads to death due to the breaking and bleeding of the arterial aneurysm in aortic dissection as well as the ischemia of important organs. Close observation on the changes of the disease and various kinds of good prevention and caring before the operation could help the patients to safely pass the per-operation period for observation.

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## Competing Financial Interests

The authors declare no competing financial interests.

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# Analysis of the Relationship between the Occlusal Force and Periodontal Tissue after the All-ceramic Crown Restoration of ITI Implanted Denture

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## Abstract

To observe the prosthetic effects of the ITI implants with the CAD/CAM zirconia all-ceramic crown so as to provide evidence for clinic. The anterior teeth of 24 patients chose at clinic were accepted the ITI implant surgery and had completed the upper part of CAD/CAM zirconia all-ceramic crown. They were divided into 2 groups. The per-implant neck bone was observed and measured with intraoral radio graph at time of functional loading and 3,6 months after functional loading Clinical observation indexes were recorded 6 months after restoration. After 6-months clinical examination, the surface texture, color divert anatomical shape, marginal fit and gingival health in two groups had no statistic significance ( $P>0.05$ ); Compared to pre-restoration, the amount of implant neck bone loss have statistic significance in two groups at time of functional loading and 3,6 months after functional loading ( $P<0.05$ ); Among the two cusp inclination of ITI implant with zirconia all-ceramic crown, there were no statistic significance in the amount of implant neck bone loss at the 3,6 months after cementation ( $P>0.05$ ). After 6 months using, ITI implant with zirconia all-ceramic crown had good esthetics and gingival

**health. The all- ceramic crown with two different inclination of cusp may affect the amount of the implant neck bone loss.**

**Keywords** ITI implant, All-ceramic crown, Inclination of cusp

## Background

Implanted denture is a prosthesis formed by the dental implant and the upper structure supported by it. The controlling of the inclination of cusp of the implanted denture is an effective method for the fine-tuning of occlusal force [1]. Due to the lacking of buffering from the periodontal membrane on the interface between the implant body and the bone, the implanted body is prone to be overloaded, thus long term of overload will have adverse effects on alveolar bone leading to the loss of sclerotin. This will result in the loosening of the implanted body and eventually the failure of implant.

Therefore, the occlusal reconstruction of implanted denture should be different from natural teeth. Weinberg has proved through experiments that whenever the inclination of cusp of molar teeth was increased by 10 degrees, the lateral load would increase by 30% [2] whereas the vertical load would be reduced by about 64%~96% with significant reduction of the lateral force incurred in the neck[3]. The inclination cusp of the occlusal of the implanted denture is in direct proportion to the occlusal force. Therefore, the design for the restoration of the implanted denture should try to reduce the inclination of cusp and the depth of the furrow and groove of the occlusal within the allowed scope so as

to reduce the lateral force and increase the service life of the implanted body. In this study, we plan to analyze the impact of two different degrees of inclination of cusp with identical width of occlusals on the health of surrounding tissues that received the zirconia all-ceramic crown restoration bodies. These clinical observations will provide corresponding theoretical basis for the restoration of the zirconia all-ceramic of the ITI implanted denture, so that the occlusal force of the implanted denture teeth matches the resistance force of the bone around the implant thus improving the survival rate of the implants and implanted denture life.

## Materials and methods

### Experimental materials and devices

M fine silicon rubber impression material (US 3M Company), the GYPSTONE SSS anhydrite (San-Esu Gypsum Company Limited in Japan), dental occlusion paper (Bausch Company in Germany), dental super cementing medium Super-Bond C&B (Nissin Dental

Products Inc.), Vita Toothguide 3D-Master colorimetric plate (VITA Company in Germany), precise ceramic caliper gauge (Heraeus-Kulzer Dental Company Limited), micrometer (Shanghai Measuring and Cutting Tools Limited Company), and CAD/CAM system (German Sirona Dental Equipment Company Limited).

## Experimental groups and approaches

This project matches the advantageous clinical professions at the level of autonomous region of Yinchuan Municipal Dental Hospital. The Department of Implantation of Yinchuan Municipal Dental Hospital had already implanted near 100 pieces of ITI implant bodies. From these patients, our group chose 20 subjects from the year of 2009 to 2010 who met the inclusion criteria and have finished Phase I operation but need to have zirconia all-ceramic crown restoration in the upper structure. Among them there were 11 males and 9 females who aged from 20 to 50 years old and each had 24 teeth. With the informed consent from the patients, they were randomly divided into two groups with 12 cases of each based on different degrees of cusp inclination.

Group A: The width of the buccolingual diameter of the zirconia all-ceramic crown restoration of the ITI implanted body was of two thirds of the opposite natural tooth of the same name with the inclination of cusp as  $15^\circ$  and sufficient spillway forms coming into being on the occlusal. There were 12 cases; in Group B, the

width of the buccolingual diameter of the zirconia all-ceramic crown restoration of the ITI implanted body was of two thirds of the opposite natural tooth of the same name with the inclination of cusp as  $25^\circ$  and sufficient spillway forms coming into being on the occlusal. There were 12 cases. Clinical examination was conducted on the restored body and photographing of X-rays for evaluation of the amount of the lost sclerotin in the neck of the implanted body in the two experimental groups was performed on the date of the restoration, three months and six months after the restoration, respectively.

## Measuring methods

The periapical film was scanned by the Canonscan 3200F scanner, and the parameters were set up as black-and-white positive film with the resolution as 600DPI and the grey level as 256, which was then saved as image in the form of tiff. A Vernier caliper was taken to measure the distance from the flat on top of the implanted body to the mesio neck and from the distal neck to the junction of alveolar ridge top. Every teeth film was measured by three doctors for obtaining the average values.

## Statistical analysis

All the indexes took the tested teeth as the unit, and statistical analysis of the data was conducted with the SPSSI 3.0. T test was conducted to compare the various types of indexes within the two groups.

## Results

Table 1 and Table 2 were the average value and the standard differences of the two groups. Statistical analysis had been conducted on the data with the SPSS 3.0 software package. The results showed that the amounts of the lost sclerotin on the neck of the implanted body three months and six months after the crowns were put on patients were all higher than those on the exact date when the crowns were put on patients in the two experimental groups. In addition, vertical comparison of the results within the respective group were all of statistical difference ( $P < 0.05$ ). However, the amount of the absorbed sclerotin on the neck of the implanted body between the two experimental groups were not significantly different after three and six months of the all-ceramic crowns implantation ( $P > 0.05$ ). Table 1 and Table 2 showed the changes of the amounts of the absorbed sclerotin on the neck of the implanted bodies after the crowns were put on patients in both groups.

the process of the rumination the upper structure of the implanted denture directly transmits the occlusal force to the jawbone tissues through the implanted body. The osseo-integration of the implanted bodies lacks the buffering function against the occlusal force, and thus the stress exceeding the physiological scope of the bone tissues will cause the absorption of the bones around the implanted bodies or the loss of osseo-integration, thus leading to the failure of the restoration of the implantation. This experiment aims to enhance the survival rate and service life of the implanted denture through investigation of the effect of two different degrees of cusp inclination of the ITI implanted bodies and zirconia all-ceramic crown restoration bodies on reducing the occlusal force so as to provide reference for optimized clinical application.

## Factors affecting the results of the restoration

Currently, common clinical practice after Phase I operation of implantation in which ITI body is implanted into the bone with the wound sealed and allowed to heal without load for four to six months, involves a X-ray photograph taken to confirm the complete osseo-integration of implanted body with the surrounding bone tissues and a consequent installation of the abutment as well as the restoration of the upper structure. The abutment is selected according to the angles and positions of the implanted bodies. The tested teeth enrolled in this experiment were all located in the area of the molar teeth. Straight abutment had been selected to increase the liability of the experiment. After the all-ceramic crown is positioned, X-ray examination is conducted again to ascertain accurate positioning on the abutment. If not,

## Discussion

Since the development of implanted denture, many scholars had conducted tremendous researches and explorations on the reasonable designs of their upper structures. Bad biological mechanical factors and oral sanitation conditions are the most commonly seen reasons for the failure of clinical denture implantation<sup>[4, 5]</sup>. It has been widely known that the bonding between the implanted body and the bone tissues are through direct bone integration without the existence of natural periodontium. Therefore, unlike the natural teeth, during

the all-ceramic crown may rotate and squint, thus leading to the failure of the restoration. Excess margin of the CAD/CAM all-ceramic crown will directly oppress the surrounding gingiva tissues, whereas insufficient margin will cause food retention. Coarse surface which could not be tightly integrated to the upper structure will also lead to gingiva tissue inflammation through irritation. During the process of making the restoration, doctors take clinical pictures and communicate with the technicians to make the crown referring to the anatomical shape and the axial surface flatness of the opposite teeth with the same names. In trial use, it is required that the edge of the all-ceramic crown is intact and smooth and meets the Grade A standard on the anatomical shape, the surface texture, and the edge compatibility. The all-ceramic crown made by the CAD/CAM system has good effect of restoration because the zirconia materials have good biological compatibility and will not cause allergic responses. The operation of CAD/CAM is simple and time-saving, and the marginal adaptation of the made restoration is high. Therefore, it has reduced the number and time of clinic visits. The CAD/CAM zirconia all-ceramic crown has extremely high toughness against fracture and strong sturdiness. Research from other countries has shown that<sup>[6]</sup> the abrasive resistance of ceramic is higher than that of ordinary metal restoration materials, and no cases of fractured porcelain had been seen in the 24 cases of all-ceramic crowns in this experiment. During sticking, improper operation or too thick binder may lead to inaccurate positioning of the all-ceramic crown thus affecting compatibility of the all-ceramic crown at the edge. Clinical operation seeks to completely clean the redundant binder given the fact that the fine binding materials left after operation may lead to the hyperplasia

and hypertrophy of the gingival tissues, thus causes gingival inflammation<sup>[7]</sup>. This may weaken the effects of positioning and restoration.

During the whole process of restoration, it is required that the patients should maintain their oral sanitation and should be directed to accurately clean the implanted denture. Follow-up should be conducted regularly to examine whether some parts have been loosen or not and whether the upper restoration shows displacement. In addition, X-ray pictures should be taken in order to timely eliminate adverse factors. In the meanwhile when conducting Phase I operation, the clinical doctors are required to strictly select the indications and make reasonable plans for implantation so as to render optimum implantation position and depths for the implanted body and to increase the usage rate of the implanted denture.

### **Changes of the loss of the alveolar bone on the neck of the implanted body after the CAD/CAM zirconia all-ceramic crowns are put on**

During the process of the implantation treatment, the iconographical examination plays a very important role. Before the Phase I operation, important information like the shape, structure, and bone density of the bones in the area losing teeth could be provided for making the treatment plan. Meanwhile, in follow-ups it is also helpful for observing the synostosis status of the implanted body and the bone loss around it thereby the therapeutic effect is evaluated. Currently, what have been commonly used in clinical practice are panoramic films and periapical films. The image of the panoramic films has poor definition, and they are used to evaluate the



local details rather difficult to be distinguished in the loss of the bones around the implanted body. The periapical films have high quality images with relative higher spatial resolution, so they could be used to observe the changes of the bone tissues around the implanted body. Compared to the histologic methods, the standard periapical film with precision of 0.11mm accounts for 73.4%, while those with precision of 0.11mm~0.12mm accounts for 16.9%<sup>[8]</sup>, which could be used as one of the approaches for vertical clinical evaluation. Under the load conditions, transmission of the force via the implanted body and the surrounding tissues are in close relationship with the inclination of cusp of the restoration. Han Dongming<sup>[9]</sup> and others have proved with experiments that under various kinds of loads the equivalent stresses of the implanted body and the jaws are all located at the neck of the implanted body and the bone cortex adjacent to the neck, which is gradually decreased to the root of the implanted body. The higher inclination of cusp is in direct proportion to stress concentration. Cibirka and others<sup>[10]</sup> speculated that the stress of the bones surrounding the implanted body would increase with the increasing of the inclination of the cusp. Weinberg has proved through experiments<sup>[11]</sup> that whenever the inclination of cusp of the molar teeth increases by 10°, the lateral load of the implanted body will increase about 30%. Based on the result of this experiment, the amount of the bone loss at the neck of the implanted body are increased at both three months and six months after the ITI implanted denture received the restoration of CAD/CAM zirconia all-ceramic crowns with different degree of cusp inclinations in two groups. This indicates that the inclination of cusp may have stress reaction to the

bone tissues at the neck of the planted body. However, the amount of the bone loss at the neck of the implanted body in the two groups are not statistically different.

In summary, this experiment only studied the effect of the two kinds of CAD/CAM zirconia all-ceramic crowns with different inclinations of cusps on the sclerotins at the neck of the implanted body and the clinical indexes, further investigation of the effect of different occlusal widths and inclinations of cusps on the stress of the bones surrounding the implanted bodies is needed.

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## Competing Financial Interests

The authors declare no competing financial interests.

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Group No.	On the day when the crown was put on	Three months after putting on the crowns	Six months after putting on the crowns
Group A	0.1608±0.032	0.2792±0.151	0.3708±0.114
Group B	0.1625±0.030	0.3117±0.290	0.4267±0.115

Table 1 Changes of the amounts of the absorbed sclerotin on the neck of the implanted bodies (mm, mean±s, n=12)

Experimental Group No.	Group A	Group B	P Value
3 months after putting on the crown	0.2792±0.151	0.3117±0.290	P>0.25
6 months after putting on the crown	0.3708±0.114	0.4267±0.115	P>0.10

Table 2 Compared of the changes in the amounts of the absorbed sclerotin on the neck of the implanted bodies (mm, mean±s, n=12)



# Analysis and Intervention on the Psychological Status and Influential Factors of the Family Members of the Children Patients with Chronic Kidney Disease

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## Abstract

To investigate the psychological status of families of Children with CKD care to the families. Conducting SCL-90 scale and questionnaire including career, residence, education, income, course of the disease, health station to involve the psychological status of parents. The psychological status guardians of children with CKD are abnormal. Most people show the abnormal relating to the family income, course of the disease and the relapse of the disease et al. Families of children with chronic kidney disease need multidisciplinary care. Nurses should offer care various from person to person.

**Keywords** Chronic kidney disease, Families, Psychological status, Correlation analysis

## Background

Chronic kidney disease (CKD) occurs when the renal damage and (or) glomerular filtration rate (GFR) drop below  $60\text{mL}/(\text{min}\cdot 1.73\text{m}^2)$  and has lasted for no less than three months. It has been reported [2] that the morbidity of pediatric CKD in China was 16.1%. This disease is liable to reoccur and could gradually deteriorate to be uremia in addition that there were a lot of complications during the process of treatment [3-4]. If a child had this kind of disease, it was a kind of very strong psycho-stressor to their family members, during which the family members not only acted as the persons for caring and guarding the patient but also need psychological consultation and nursing so the

psychological status of the family members and whether they could be qualified for the guarding and nursing work, because these factors are of important influences to the effect of the treatment on the children patients [5]. Currently more and more attention had been paid to the psychological status of the family members of the children patients having CKD. This research had adopted questionnaire for investigation to explore the psychological health status of the family members of the children patients with CKD and the influencing factors so as to provide basis for formulating targeted psychological nursing in clinical practice.

## Clinical materials and methods

### Targets for researching

The fathers, mothers, or the guardians of 319 children patients hospitalized in the Department of Pediatrics during the period from January 2012 to June 2013 and diagnosed as having CKD, among whom there were 162 males and 138 females.

### Standards for enrollment and exclusion

Standards for enrollment:

(1) The fathers or mothers (or the direct guardians) of

the hospitalized children patients in conformity with the diagnosis of 'CKD'.

(2) The patients aged from 1 to 16 years old.

(3) The children patients had the disease for more than three months.

Standards for exclusion:

(1) The family members of the dead patients.

(2) The information of the guardians is unable to be obtained.



## Tools for investigation

SCL-90 [6], the table prepared by Derogatis for self-evaluation of symptoms, had been used. The measurement and analysis could be generalized to be ten factors: F1 somatization, F2 obsessive-compulsive symptoms, F3 interpersonal relationships, F4 depression, F5 anxiety, F6 hostility, F7 fear, F8 paranoia, F9 psychoticism, and F10 others. The scores for every item are as below: 1 point for 'None', 2 points for 'Light', 3 points for 'Medium', 4 points for 'Serious', and 5 points for 'Very Serious'. The higher the scores of the aforementioned factors are, the more serious the psychological abnormality will be. The contents of ordinary materials include gender, age, place of residence, educational status, vocation, family income, healthy status, the disease process of the children patients, whether the disease has reoccurred, and whether the children patient has medial insurance.

## Methods for investigation

The leader of the group of nurses having received and distributed the questionnaires to the family members of the hospitalized patients, and made sure they met the requirements on the standards for enrollment. Every questionnaire was completed by a family member independently, and if the family member could not understand the contents in the questionnaire due to low educational status, the implementer of the questionnaire might interpret every item as an instruction for completing the answers.

## Statistical methods

The SPSS 17.0 statistical software package had been taken to conduct analysis, the scores for all the items in SCL-90 had been compared with the national norms, and the analysis on the relevance between the scores of the various items of positive symptom factors and the status of the children patients had adopted the multiple relevant analyzing method of Pearson (correlation coefficient). Other statistical methods included the adoption of t examination and analysis of variance. The difference was  $P < 0.05$ , which was of statistical meaning.

## Results

Altogether 310 tables had been distributed, 310 pieces were recollected, but 300 pieces were valid, so the effective recovery rate was 96.74%.

### Comparison of the SCL-90 scores of the family members of the children patient with 'CKD' and the domestic norm scores

The differences between the interpersonal relationship, oppression, anxiety, as well as paranoid status of the family members of the children patients and the domestic norm [6] were of statistical meaning.

### Results of the analysis on the factors related to the positive

## Factors of the psychological status of the family members of the children patient

The changing of the interrelationship factors was related to the educational status, economic status, and disease type of the children patients. The depression factors are related to the economic status, whether the disease reoccurred to the children patients, and whether the patient had health insurance. The paranoid factor was related to the body status and whether the disease reoccurred to the children patients. See Table 2.

## Results of the analysis on the single factors influencing the inter-relationship of the family members

The interpersonal relationship of the family members of the children patients having diseases lasting for more than three years obtained higher scores than those patients with the course of disease to be or be lower than three years. The difference was of statistical meaning ( $P<0.05$ ), indicating that the course of the interpersonal relationship of the family members of the children patients having more than three years of course of disease was worse than those having shorter course of diseases, (See Table 3).

## Results of the analysis on the single factors of the depression factors affecting the family members

The differences of the degrees of anxiety in different

economic income levels, the reoccurrence to the patients, and whether they had medical insurance were of statistical meaning, indicating that the degree of anxiety of those having higher income was lower than that of those having lower income. The degree of anxiety of family members of the children patients having medical insurance was lower than that of those having no medical insurance. The differences between them were of statistical meaning ( $P<0.05$ ). (See Table 4)

## Analysis on the single factor of the anxiety factor of the family member

The differences shown by the comparisons between the anxiety degrees of female and male family members, economic incomes of different families, lengths of the course of diseases of the children patients, status of the reoccurrence of the children patients, and whether they have medical insurance were all of statistical meaning ( $P<0.05$ ), indicating that the scores for anxiety of male family members were lower than those of female ones, the scores for anxiety of family members having low income were higher than those having higher income, those for the family members of children patients having longer course of diseases were unexpectedly lower than those of children patients with shorter course of diseases, those for the family members of the children patients having reoccurred diseases were higher than those for those family members of the children patients having no reoccurrence, and the degree of anxiety of the family members having medical insurances was lower than those having no medical insurance. (See Table 5)

## Results of the analysis on the single factor affecting the paranoid factors of family members

Differences also existed in the status of paranoid of family members in different physical status, indicating that those having worse physical status also had higher degrees of paranoid. See Table 6

## Discussion

### Analysis on the psychological status of the family members of the children patients

The results of this research showed that the scores for many items of the children patients were mostly higher than domestic norms. Significant differences existed in the aspect of interpersonal relationships between the two, which was related to long term of disease course, the repetitive occurrence of the disease, and the uncertain prognosis of the children patients with CKD, so they needed to go back to the hospital regularly for review or treatment and the family members had heavy economic burden. The economic status was usually the important reasons for the increasing psychological burden of the family members. In Table 1 significant differences could be seen in the comparison of the anxiety and depression symptoms of the family members who usually felt anxious or depressed because they did not understand the status of the disease or know knowledge related to the disease, which was identical to the results of related domestic researches [7] and indicating that the anxiety

and depression of the family members were kinds of common psychological status and worthy of attention. In addition, the paranoid thinking of the patient was significantly more serious than norm, which may be related to that most of the patients in our hospital had experiences of seeing doctors in local hospitals, and the family members felt very anxious about the scheme for the treatment on the children patients and thus were liable to have paranoid thinking after getting to know different treatment schemes.

### Analysis on the relevance between different demographics data and the psychological status of the family members of the children patients with CKD

1. Gender was relevant to the depression factors, and the females had more serious degree of anxiety than males, indicating that females were weaker in controlling emotions when facing the disease of the children patients;
2. Educational status may reflect the personal ability of acceptance to some degree. It could be seen from the results in Table 3 that different cultural degree had no effect on the interpersonal relationships, indicating that the problem of interpersonal relationship would exist in all of the different educational statuses.
3. Economic status was the important guarantee for life as well as the important source for the treatment of the children patient, and significant correlation existed

in interpersonal relationship, depression, anxiety, and economic status. Domestic experts [8] opined in through researches that this disease had long course so it needed tremendous cost. Bad economic status might increase the depression and anxiety of the family members.

4.The physical status of the family was significantly related to the paranoid factors, and good physical status meant that the body was healthy and had no any disease. Ordinary physical status meant having one or more kinds of chronic diseases. Different physical statues might had different paranoids, indicating that the bodies of the family members were the important pathological factors affecting the mental status of the family members.

5.The course of the disease of the children patient was related to the interpersonal relationship and depression of the family members, and the longer the course of disease was, the more the interpersonal relationship might be affected but the degree of the depression of the family members might decline, indicating that the family members were able to possibly understand the status of the disease of the children patients during the period of the disease and also had learnt some experience in nursing and had the ability to respond to some external stimuli. This was consistent to the results of some relevant domestic and foreign researches [9-10].

6.The reoccurrence of the disease in the children patients was related to depression, anxiety, and paranoid. If the children patient had the disease again, the aforementioned status of the family members would get deteriorated, indicating that the reoccurrence to the

children patients played an important role in the mental status of the family members. The family members of the children patients usually would be so worried about the prognosis of the children patients that they were afraid that the status of the children patients might not be good, and they might even blame themselves for not taking good care of the children, to which the clinical nurses should pay special attention.

7.It could be seen in Table 2 that the vocations of the family members were significantly related to the interpersonal relationship factors, but the results in Table 3 showed that there was no difference among the interpersonal relationships of the family members having different vocations.

8.The medical insurance was significantly related to the depression and anxiety factors of the family members, differences existed in the status of anxiety, and the family members having no medical insurance had more serious emotions of depression and anxiety. The existence of medical insurance had reduced the economic burden of the family of the patients, and it had a similar effect to the psychological status of the family members as economic status [11].

## Intervention measures

To stress the psychological status of the family members and provide psychological support

To take the initiative to provide help through getting to know about the psychological needs of the group of the family members of the children patients, to

understand the pressure of the family so as to make detailed interpretation especially to the family members of the children patients having long course of disease and reoccurred disease according to the learned status, to conduct timely explanation on the symptoms resulted from the disease so as to prevent the family members from being unable to accept in-time suggestions or comprehensively understanding the disease of the patients due to the forming of oriented thinking for having a long-term old patient, and to reasonably arrange beds based on the overall needs and details of the family members.

### **To pay attention to the fundamental status of the family members and assist in pursuing support from the society**

Every family had different status, and the nurse should notice the differences in different individuals during the process of providing psychological caring to the children patients and the family members in addition to identifying the major symptoms of the family members of the children patients and provision of psychological support. As to those having difficulties in family income, the nurses might provide related routes for help from governmental institutions and social institutions so as to render the family members to obtain economic support from social institutions and relieve some of the economic pressures.

### **To pay attention to the subjective symptoms of the family members**

### **and improve their ability in psychological response**

More care should be taken to the physical health status of the family members during the nursing, such as the food and sleep of the family members themselves, indicating that the food for the family members should not be limited as what had been done to the children patients and nutrition should be appropriately increased. When the family members had insomnia, the nurses should take the initiative to communicate with them, including listening to their annoyances, helping to solve their reasonable needs, providing necessary psychological and consulting directions, and improving the ability of the family members in psychological response.

## **Conclusions**

It could be concluded that the psychological status of the family members of the children patient with CKD could be affected by many factors and might also have interactive effect. Different demographic data were not consistent to the psychological status of the family members of the children patients having CKD, indicating that the clinical caring staffs should pay attention to various kinds of family members, provide corresponding caring measures, actively offer psychological support to the family members of the patients, assist them to accurately learn about their psychological problems so that they could optimistically face pressure and get rid of various kinds of bad psychological emotions in correct methods, and give help for better cooperating with the

medical nursing so as to render the children patients to smoothly finish the treatment and improve the living quality of the children as well as their family members.

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## Competing Financial Interests

The authors declare no competing financial interests.

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Items	Domestic Norm (n=1388)	Family Member (n=300)	t	P
Somatization	1.37±0.48	1.39±0.08	0.71	>0.05
Obsessive-compulsive symptoms	1.62±0.58	1.65±0.74	0.55	>0.05
Interpersonal relationships	1.65±0.61	1.82±0.10	4.76	<0.05
Depression	1.50±0.59	1.71±0.15	5.97	<0.05
Anxiety	1.39±0.43	1.49±0.12	3.88	<0.05
Hostility	1.46±0.55	1.46±0.11	0	>0.05
Fear	1.23±0.41	1.25±0.14	0.80	>0.05
Paranoid	1.43±0.57	1.78±0.54	7.72	<0.05
Psychoticism	1.29±0.42	1.30±0.44	0.28	>0.05

Table 1 Comparison of the SCL-90 scores of the family members of the children patient with CKD and the domestic norm scores

Items	Interpersonal relationship F3	Depression F4	Anxiety F5	Paranoid F8
Gender	0.084	0.107	-0.510**	0.178
Age	-0.055	-0.171	-0.105	-0.129
Place of residence	-0.038	-0.002	-0.044	-0.088
Educational status	0.396**	0.030	-0.170	0.089
Economic status	0.540**	0.343**	0.273**	-0.074
Body status	0.108	-0.107	-0.057	0.625**
Course of disease	0.396**	-0.029	0.362**	-0.031
Reoccurrence or not to the children patient	0.188	0.554**	0.226*	-0.269**
Having medical insurance or not	-0.031	0.306**	-0.211*	-0.110



Note: The data in the table are related coefficient of Pearson; in the table ※※ means  $P < 0.01$ , ※ means  $P < 0.05$

Table 2. Results of the analysis on the factors related to the positive factors of the psychological status of the family members of the patient

Fundamental status		n	Interpersonal relationship F3	t value	P
Educational status	Be or below College Degree	181	1.83±0.32	0.42	>0.05
	Bachelor's degree or above	119	1.81±0.36		
Economic status (Family per capita income)	≤ RMB 1500 Yuan	164	1.84±0.17	1.92	>0.05
	>RMB 1500 Yuan	136	1.80±0.12		
Course of disease of the children patient	≤3 years	139	1.75±0.11	6.38	<0.05
	>3 years	161	1.89±0.19		

Table 3 Analysis on the single factor affecting the interpersonal relationship of the family members.

Fundamental status		n	Interpersonal relationship F3	t value	P
Economic status (Family per capita income)	≤ RMB 1500 Yuan	164	1.75±0.16	3.88	<0.05
	>RMB 1500 Yuan	136	1.67±0.13		
Reoccurrence to the children patient	Yes	127	1.76±0.16	3.79	<0.05
	No	173	1.66±0.21		
Medical insurance	Yes	117	1.63±0.19	6.61	<0.05
	No	180	1.79±0.15		

Table 4 Analysis on the single factor of the depression factor affecting the family members

Fundamental status		n	Interpersonal relationship F3	t value	P
Gender	Male	146	1.39±0.43	3.45	<0.05
	Female	154	1.59±0.39		
Economic status (Family per capita income)	≤RMB 1500 Yuan	164	1.55±0.17	5.77	<0.05
	>RMB 1500 Yuan	136	1.43±0.12		
Course of disease of the children patient	≤3 years	139	1.55±0.21	3.76	<0.05
	>3 years	161	1.43±0.24		
Reoccurrence to the children patient	Yes	127	1.56±0.11	6.64	<0.05
	No	173	1.42±0.18		
Medical insurance	Yes	117	1.39±0.15	9.12	<0.05
	No	183	1.58±0.17		

Table 5 Analysis on the single factor of the anxiety factor affecting the family members

Fundamental status		n	Interpersonal relationship F3	t value	P
Physical status	Good	174	1.70±0.43	2.27	<0.05
	Worse	126	1.86±0.56		
Reoccurrence to the children patient	Yes	127	1.79±0.32	0.37	>0.05
	No	173	1.77±0.43		

Table 6 Analysis on the single factor affecting the paranoid factors of the family members



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