

Analysis on Effect and Relevant Factors of Ultrasound-Guided Lauromacrogol Sclerotherapy to Benign Thyroid Cyst

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Abstract. Purpose: lauromacrogol sclerotherapy was implemented through ultrasound-guided puncture of thyroid cyst for discussing the therapeutic effect to lauromacrogol hardening thyroid cyst. Method: 50 patients accepting thyroid cyst puncture sclerotherapy in ultrasonography department of our hospital were selected, cystic cavity volume was $\geq 2\text{cm}^3$, all patients were benign according to cytopathology diagnosis, and they were respectively followed at 1st, 3rd and 6th months after operation. Curative effect was evaluated as follows: the therapy was invalid if cystic cavity volume was reduced by $<50\%$, the therapy was valid if the volume was reduced by $\geq 50\%$, and the patient was cured if the volume was reduced by $\geq 90\%$. Results: cyst base line and volumes at the at 1st, 3rd and 6th months after treatment were respectively $8.02 \pm 6.51\text{ cm}^3$, $6.12 \pm 2.23\text{ cm}^3$, $3.13 \pm 2.43\text{ cm}^3$ and $2.01 \pm 1.58\text{ cm}^3$; the cystic cavity volume was reduced by $(72.4 \pm 23.5.7)\%$ on average; cumulative efficiency was 84.0% ($42/50$), cure rate was 76.0% ($38/50$); 12.0% ($6/50$) cysts should undergo sclerotherapy again since they was increased or not reduced compared with the base line 1 to 3 months later. Conclusion: ultrasound-guided puncture lauromacrogol sclerotherapy to benign thyroid cyst was safe and effective, and it reached the maximum therapeutic effect within 6 months.

1. Introduction

Thyroid nodule belongs to clinical common disease and frequently-occurring disease. Most thyroid cysts are benign, but clinical treatment is frequently required due to reasons such as appearance, local oppression, etc. Mere drainage is simple and economic with high recurrence rate. Cyst can be cured completely by surgical resection, but it has the characteristics of large trauma, certain surgical risks and higher costs. Puncture sclerotherapy is a simple and effective clinical treatment method, which cannot be carried out and applied in China due to various reasons. Lauromacrogol, as the blood vessel hardening agent, is gradually applied to sclerotherapy of cyst in recent years. However, related reports are deficient in thyroid cyst application. In the paper, the thyroid cyst follow-up results of ultrasound-guided puncture lauromacrogol sclerotherapy of our department in recent years were summarized, and the efficiency and feasibility of thyroid cyst lauromacrogol hardening were analyzed.

2. Materials and Methods

2.1 Research Object.

50 patient (16 male cases and 34 female cases) underwent ultrasound examination from July 2015 to July 2017. It was discovered that the cystic cavity volume size of cystic thyroid nodule is higher than 2.5cm^3 . The patients suffered from no serious heart, lung and liver dysfunction, coagulation dysfunction and other diseases through medical history, physical examination and laboratory examination.

2.2 Instruments and Methods.

Instruments and drugs. ultrasonic instrument was Mind ray DC-8Exp color Doppler ultrasound diagnostic apparatus, convex array probe (3.5MHz); America BD disposable venous indwelling needle (16G*15cm); manual suction biopsy needle 21G*8 cm (Japan, TSK; hardening agent was lauromacrogol injection (Shaanxi Tianyu Pharmaceutical Co., Ltd., 100mg/10mL/pieces).

Preoperative examination. clinical course, signs and symptoms of patients were recorded. The following examinations were perfected: thyroid function, thyroid globulin (TG), anti-thyroid peroxidase antibody (TPO-ab), thyroglobulin antibody (TG - ab), calcitonin (sCT), blood routine examination, coagulation indexes, etc. Thyroid ultrasound measurement was implemented again. The cyst volume (cm³) was calculated according to cyst length (cm) * width (cm) * thickness (cm) * $\pi/6$. The safety of puncture path was evaluated, and surrounding blood vessels and nerves were avoided.

Puncture and sclerotherapy patients were placed on the supine position. The shoulder was lifted upwards, the neck was properly faded to expose the neck, towel was disinfected regularly, and ultrasonic probe was wrapped with sterile protective cover. The puncture point underwent local subcutaneous infiltration and anesthesia with 1% lidocaine after ultrasonic localization. 16G disposal venous indwelling needle was used for entering into the cyst under guidance of ultrasound, the cyst fluid was sampled slowly with negative pressure, cyst fluid quantity, color and viscosity were observed, the displacing liquid respectively underwent thin-layer liquid-based cytologic examination and parathyroid hormone detection. Sclerotherapy: the direction and position of remaining needle are adjusted under the guidance of ultrasound, the cyst fluid was extracted completely, and appropriate amount of lauromacrogol was injected according to 1/3-1/2 of the extracted cyst fluid. The needle core was removed, and the operation was ended. Puncture frequency and high negative pressure or rapid suction were reduced in the operation as far as possible, and cyst internal bleeding was avoided. The patient is advised to avoid swallowing or coughing during treatment before puncture. Local pressure was increased for 10 min and observed for 30 min after operation.

Follow-up and curative effect evaluation. Patients returned to ultrasonic department for follow-up at the 1st, 3rd, 6th, and 12th months after operation. Changes of thyroid cystic cavity size were measured with ultrasound. If the cyst was increased or not reduced compared with base line at the 1st to 3rd months after treatment, the second sclerotherapy was implemented. Therapeutic effect evaluation included changes of thyroid overall cyst and cystic cavity volume compared with base line; the therapy was invalid if the cystic cavity volume was reduced by <50%, the therapy was valid if the volume was reduced by 50%, and the patient was cured if the volume was reduced by more than 90%.

3. Results

3.1 General Information.

50 patients (16 male cases and 34 female cases); overall thyroid cyst base line volume was $8.02 \pm 6.51 \text{ cm}^3$, and median was 6.23 cm^3 ($3.28 \sim 15.74 \text{ cm}^3$). Related indicators of thyroid were normal.

44 of 50 cysts underwent sclerotherapy once merely, 6 (12.0%) cysts underwent sclerotherapy again if the volume was increased or not reduced at the 1st or 3rd months compared with the base line.

3.2 Analysis on Curative Effect.

cyst base line and volume at the 1st, 3rd and 6th months after treatment were respectively $8.02 \pm 6.51 \text{ cm}^3$, $6.12 \pm 2.23 \text{ cm}^3$, $3.13 \pm 2.43 \text{ cm}^3$ and $2.01 \pm 1.58 \text{ cm}^3$, all follow-up cyst volume had prominent statistical difference compared with the base line ($P < 0.001$); the average cystic cavity volume was reduced by $(72.4 \pm 23.5.7) \%$; cumulative efficiency was 84.0% (42/ 50), and the cure rate was 76.0% (38/50). The effect at the 6th month after treatment was compared with that at the 3rd month. Cystic cavity volume was still reduced significantly ($V_3 - V_6$, $2.08 \pm 5.73 \text{ cm}^3$, $t = 2.06$, $P = 0.045$). The sclerotherapy final efficiency was 84.0% (42/50), cure rate was 96.0% (48/50), male and female curative effect had no prominent difference.

3.3 Untoward Effect.

Only 1 of 50 patients complained local mild burns (2.0%) during hardening, the symptom was alleviated by the patient himself within 10 min, and the patient suffered from dysphonia, hoarseness, and face flush and other symptoms. There were another two cases suffering from low fever on the day or the following day after sclerotherapy. The symptoms were self-alleviated without special treatment, and it may be related to drug therapy.

4. Discussion

Thyroid cyst is a clinical common thyroid disease. Most thyroid cysts are benign, and the malignancy rate was about 0.5%~3% [1]. thyroid cyst treatment and treatment method depend on benign and malignant cysts and volume. The benign thyroid cyst should be treated basically after local pressure symptom and appearance influence appeared locally. Guidance suggestion: cysts with diameter $\geq 1.5\sim 2.0$ cm should undergo ultrasound-guided fine needle puncture pathology (US-FNA) or treatment [2]. Current treatment means include mere liquid extraction, sclerotherapy, surgical excision, chemical or physical ablation, etc. Mere liquid extraction treatment has high recurrence rate (60%~90%), especially for repeated extraction and cysts with larger cyst volume [3], and the practice is not implemented and applied regularly due to various reasons in China. After lauromacrogol was injected in the cyst cavity, myointimal cell is damaged during cleaning of cyst inner wall, cyst fluid seepage is reduced, and synechia is generated. The cystic cavity is blocked due to fibrosis, thereby reaching sclerotherapy purpose. It has been used in hemangioma, internal hemorrhoids, varicose veins, tendon sheath, renal cyst and other sclerotherapy for many years [4]. The latest animal experiments showed that partial thyroid tissue fibrosis caused by lauromacrogol does not affect thyroid function and leads to thyroid and surrounding tissue synechia [5]. Meanwhile, the clinical research at home and abroad show lauromacrogol has excellent safety and efficiency during application in thyroid cyst sclerotherapy as hardening agent [6]. In clinical practice, we found that cyst internal bleeding/seepage risks can be reduced during puncture through selecting puncture parts with less blood flow, reducing puncture frequency as far as possible, avoiding excessive negative pressure, and avoiding too high pressure during rapid extraction and flushing. In conclusion, ultrasound-guided lauromacrogol sclerotherapy has excellent therapeutic effect aiming at benign thyroid cyst, and the side effects are rare. Meanwhile, the method is economic and simple. The mere cyst therapeutic effect is the best aiming at thin cyst wall, thin mucus and no membrane in the cyst. The possibility of multiple treatment is higher aiming at cysts with long course of disease, abundant blood flow around the cyst, large proportion of solidness and excessive membranes in the cyst. The effect should be more suitable if RF/microwave ablation treatment or direct surgical surgery after liquid extraction is adopted.

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