

Analysis of the Therapeutic Effect of Plaster Compression Fixation on Auricular Pseudocyst

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ABSTRACT

Objective: To compare the therapeutic effects of plaster compression bandaging versus conventional gauze compression bandaging after puncture in the treatment of auricular pseudocyst and provide a basis for selecting an optimal clinical treatment.

Methods: From May 2021 to May 2024, 80 patients diagnosed with auricular pseudocyst at our hospital were randomly divided into two groups (40 cases each). The observation group received plaster compression bandaging, while the control group underwent conventional gauze compression bandaging after puncture. Key indicators, including treatment duration, healing speed, cure rate, recurrence rate and complication rate, were recorded and compared between the two groups.

Results: The observation group demonstrated significant advantages over the control group in terms of shorter treatment duration, faster healing, higher cure rate and lower recurrence rate, indicating superior safety and stability (all $P < 0.05$).

Conclusion: Plaster compression bandaging is an effective treatment for auricular pseudocyst, characterized by shorter treatment time, faster healing, higher cure rates, lower recurrence rates and fewer complications. It is recommended for broader clinical application to enhance treatment outcomes and improve patient quality of life. This study provides valuable insights for refining the treatment strategy for auricular pseudocyst.

Keywords: Auricular pseudocyst; Compression bandaging; Plaster; Puncture; Cartilage; Effusion

Introduction

Auricular pseudocyst is a relatively common ear disease encountered in clinical practice. Its primary characteristic is the accumulation of sterile fluid between the auricular cartilages, leading to localized swelling of the auricle. While this condition is typically not life-threatening, failure to treat it promptly and effectively may result in changes to auricular morphology,

pain, discomfort and long-term aesthetic concerns, thereby significantly impacting patients' quality of life. Currently, various treatment options exist for auricular pseudocysts, including aspiration, compression bandaging and surgical resection¹⁻⁵. However, due to variations in cure rates, recurrence rates and ease of implementation among these methods, no universally accepted optimal treatment protocol has yet been established⁶⁻⁸.

Materials and Methods

General information

A total of 80 patients with auricular pseudocyst who underwent conservative treatment with pressure bandaging at our hospital between May 2021 and May 2024 were recruited (**Figure 1**) and randomly assigned to the observation group (plaster compression fixation group) and the control group (conventional gauze compression bandaging group). Specifically, the observation group consisted of 40 patients (40 males and 0 females), aged 22–65 years, with a mean age of (44.93 ± 15.00) years; the control group also included 40 patients (40 males and 0 females), aged 21–64 years, with a mean age of (37.75 ± 13.94) years. No statistically significant differences were observed in general characteristics such as gender and age between the two groups ($P > 0.05$), ensuring comparability.

Inclusion criteria: All participants were clinically diagnosed with auricular pseudocyst, characterized by localized swelling on the outer side of the auricle, clear boundaries, absence or mild tenderness upon palpation and a positive translucency test. Participants were aged 18–65 years, regardless of gender and had experienced their first episode without prior treatment.

Exclusion criteria: Patients with severe systemic diseases (e.g., heart or lung insufficiency, coagulation disorders) that precluded tolerance to local treatment; auricular lesions resembling cysts caused by trauma, infection or other factors; and individuals with mental disorders or an inability to comply with treatment and follow-up.

This study was approved by the Ethics Committee of Shanghai Medical University Hospital Number: 2021040. All patients provided voluntary informed consent prior to participation.

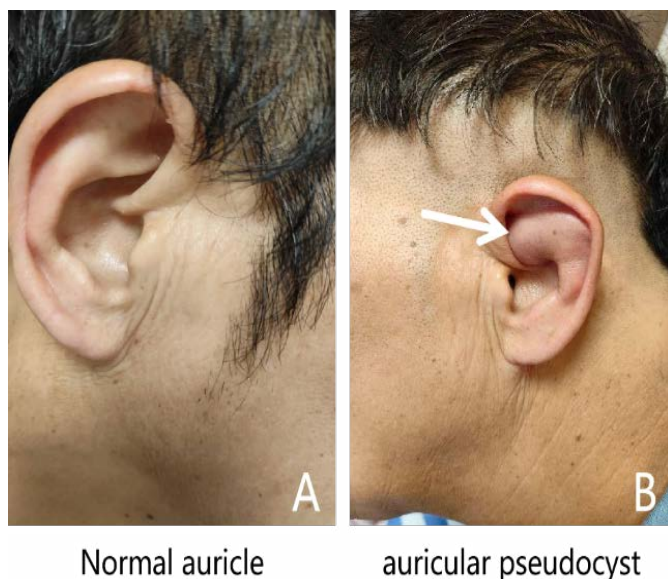


Figure 1: Normal auricle and auricular pseudocyst.

Treatment methods

Observation group (gypsum compression fixation group):

The pseudocyst of the auricle was aspirated in the observation group. Patients were seated with their heads resting on the table and the affected ear facing upward. After routine disinfection of the auricle skin, a 5ml syringe connected to a No. 7 needle was inserted at the most prominent part of the cyst to aspirate as much fluid as possible. Subsequently, compression fixation

was performed using the sandwich method with gypsum. The detailed steps are as follows:

- Dissolve gypsum powder in warm water at a ratio of 2:1 and stir evenly to form a paste for later use.
- Insert cotton balls into the ear canal to prevent the gypsum liquid from entering.
- Cut gauze pieces according to the shape of the auricle and place one layer over the cyst surface (**Figure 2A**).
- Use a tongue depressor dipped in gypsum paste to apply it evenly onto the affected ear, ensuring close adherence to the cyst surface (**Figure 2B**).
- Cover the gypsum surface with a second layer of gauze (as shown in Figure 2-C) and wrap the auricle with gauze blocks to apply pressure and shape it (**Figure 2C**).
- Reapply gypsum paste evenly onto the gauze surface to enhance fixation (**Figure 2D**).
- Finally, remove the cotton balls from the ear canal. The gypsum should be maintained for 7-10 days. During this period, closely monitor the ear's blood circulation. If symptoms such as increased ear pain, local skin discoloration or other abnormalities occur, prompt measures should be taken.

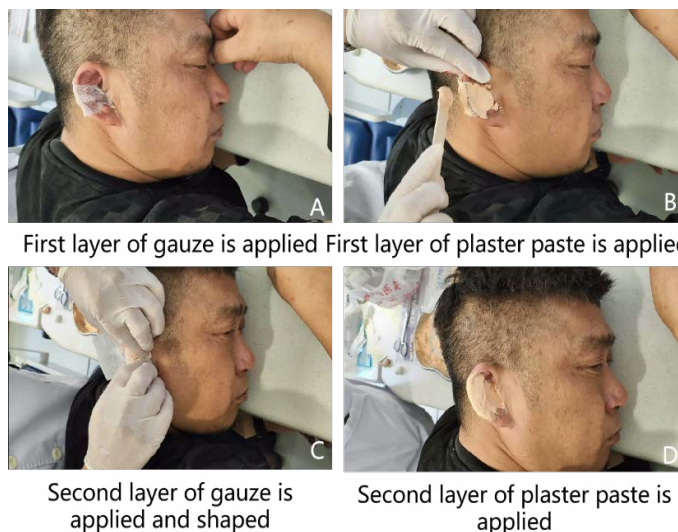


Figure 2: The sandwich method of plaster compression fixation for auricular pseudocyst

Note: In Figure 2C, appropriate pressure should be applied to the cyst area. Before the plaster is completely dry and set, it can be shaped and adjusted by gently pressing with fingers to ensure uniform pressure distribution.

Control group (conventional gauze compression bandaging):

The same puncture and fluid aspiration procedures as in the observation group were performed.

Following aspiration, conventional gauze compression bandaging was applied. Sterile gauze was folded to an appropriate thickness and placed over the puncture site and cyst area, then secured with adhesive tape or a bandage. The bandaging should be moderately tight to maintain adequate pressure while ensuring no interference with ear blood circulation. The gauze was changed every 1-2 days for 7-10 consecutive days, during which exudate formation and ear blood circulation were closely monitored.

Observation indicators

Recovery time: Document the duration from the initiation of treatment to achieving the recovery criteria, measured in days.

Cure rate: Record the number of patients in both groups who meet the cure criteria at the end of treatment and during the follow-up period⁶.

- **Cure criteria:** Complete disappearance of symptoms, including no swelling of the auricle and no discomfort such as fullness or pain; normalization of physical signs, characterized by a normal auricle shape, complete resolution of the cyst, uniform texture upon palpation, absence of bulging or fluctuation, normal skin color and no adhesion; no recurrence within 3 months of follow-up.
- **Improvement criteria:** Significant alleviation of symptoms, with marked relief of ear fullness, swelling, pain and other discomforts, reduced pain intensity and minimal impact on daily life; improvement in physical signs, evidenced by reduced auricle swelling, decreased cyst volume, weakened fluctuation and reduced local skin tension.
- **Ineffective criteria:** No improvement in symptoms, with ear swelling, pain, fullness and other symptoms remaining unchanged after treatment compared to before; no change in physical signs, including no alteration in the size, shape, texture or fluctuation of the auricle cyst and no reduction in cyst size.
- **Recurrence criteria:** Reappearance of symptoms, including recurrence of ear fullness, pain or foreign body sensation in the previously cured area; reappearance of physical signs, characterized by re-emergence of bulging and swelling in the corresponding auricle area, palpable fluctuation or localized mass and morphology similar to that of the previous auricle pseudocyst.

Recurrence rate: Patients were followed up at 3 months, 6 months and 12 months post-treatment. The number of cases with recurrence of auricular pseudocysts in both groups was recorded and the recurrence rate was calculated using the formula: recurrence rate = (number of recurrent cases / total number of cases) × 100%.

Local complications: During the treatment process, both groups were observed for the occurrence of local complications, including local infection (e.g., redness, swelling, increased pain, purulent discharge), auricular skin damage (e.g., pressure ulcers, abrasions) and auricular blood circulation disorders (e.g., cyanosis, coldness of the auricular skin).

Statistical methods: All patients' basic information, treatment conditions and observation indicator data were meticulously recorded to establish a database. Statistical analyses were conducted using SPSS 27.0 software. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$) and intergroup comparisons were performed using t-tests. Count data were expressed as percentages (%) and intergroup comparisons were conducted using χ^2 tests. A P-value < 0.05 was considered statistically significant.

Results

Comparison of cure time

Gypsum compression fixation has obvious advantages in shortening the recovery time than those of the control group and

the differences were statistically significant ($P < 0.05$) (Table 1).

Table 1: Cure Time Comparison Between Groups [$(\bar{X} \pm s)$, d].

Group	Cure Time (\bar{d})
Control group (n=40)	34.08 ± 14.69
Study group (n=40)	14.13 ± 4.98
t value	8.54
P value	<0.05

Comparison of cure rates

Within the first month of treatment, the observation group demonstrated a cure rate of 95%, with 38 out of 40 cases successfully cured. In contrast, the control group exhibited a cure rate of 62.5%, with 25 out of 40 cases cured. A statistically significant difference was observed in the cure rates between the observation group and the control group ($P < 0.05$) (Table 2).

Table 2: Cure Rates in Two Groups (n, %).

Group	Cured (n)	Improved (n)	Ineffective (n)	Cure Rates (%)
Control group (n=40)	25	10	5	62.5%
Study group (n=40)	38	2	0	95%
χ^2 value				10.756
P value				0.001

Comparison of recurrence rates

The recurrence rates of the observation group at 3 months, 6 months and 12 months were all significantly lower than those of the control group and the differences were statistically significant ($P < 0.05$) (Table 3).

Table 3: Recurrence Rates in Two Groups [n, %].

Group	3 months	6 months	12 months
Control group (n=40)	15	12	7
Study group (n=40)	2	0	0
χ^2 value	10.756	11.863	5.636
P value	<0.05	<0.05	<0.05

Comparison of local complications

There was no statistically significant difference between the observation group and the control group in terms of the incidence of local infection, auricular skin injury and ear blood circulation disorder ($P > 0.05$) (Table 4).

Table 4: Complication Rates in Two Groups (n, %).

Group	local infection (n)	auricular skin injury (n)	ear blood circulation disorder (n)	total (%)
Control group (n=40)	2	2	2	15%
Study group (n=40)	2	1	2	12.5%
χ^2 value				0.000
P value				1.000

Discussion

Analysis of the healing mechanism of auricular pseudocyst

The healing of auricular pseudocyst is a complex physiological process involving multiple key steps, including cyst wall adhesion, inflammation resolution and blood circulation improvement. These steps are interdependent and collectively determine the treatment outcomes and recurrence risk.

Cyst wall adhesion: Cyst wall adhesion represents a critical step in the healing process of auricular pseudocysts. Research shows that inadequate adhesion of the cyst walls can lead to repeated fluid accumulation and significantly increase the likelihood of recurrence. Plaster compression bandaging demonstrates a clear advantage due to its strong fixation and uniform pressure distribution, which effectively promotes cyst wall adhesion. However, this method requires more intricate operational skills and may limit patients' daily activities. In comparison, conventional gauze compression bandaging, while simpler and more cost-effective, often suffers from uneven pressure distribution, potentially compromising treatment efficacy, especially during patient movement when pressure fluctuations occur. Therefore, selecting an appropriate treatment approach necessitates balancing therapeutic effectiveness with individual patient needs.

Inflammation resolution: Inflammation plays a pivotal role in the development of auricular pseudocysts. Effective compression bandaging reduces effusion production, thereby accelerating inflammation resolution. Plaster compression bandaging provides stable pressure distribution, leading to faster alleviation of inflammatory symptoms compared to conventional gauze compression bandaging, which exhibits greater pressure variability and may slow down inflammation resolution. This could prolong the treatment duration or reduce the cure rate. Additionally, individual patient factors such as immune function and local tissue characteristics may influence inflammation resolution speed, posing additional challenges for clinical management.

Improvement of blood circulation: Appropriate compression not only facilitates cyst wall adhesion and inflammation resolution but also improves blood circulation, reducing local edema. The magnitude and distribution of pressure are critical in influencing blood circulation. Excessive pressure may compress blood vessels, impede blood return, cause tissue hypoxia and impair nutrient supply, negatively affecting healing. This study monitored ear pressure changes to elucidate differences between plaster compression bandaging and conventional gauze compression bandaging in terms of blood circulation improvement. Results indicate that plaster compression bandaging achieves sufficient pressure while avoiding excessive compression, maintaining optimal local blood circulation balance.

Discussion on the advantages of plaster compression fixation treatment mechanism

Pressure uniformity: A significant advantage of plaster compression bandaging is its ability to provide uniform pressure distribution. This consistent pressure facilitates cyst wall adhesion, thereby promoting the healing process. In contrast, conventional gauze compression bandaging, due to its soft material and reliance on manual operation, often results in uneven pressure distribution. Uneven pressure not only compromises cyst wall adhesion but may also lead to residual fluid accumulation, increasing the risk of recurrence. Therefore, pressure uniformity is a critical factor in evaluating the effectiveness of treatment methods.

Fixed stability: Once dried, plaster forms a rigid shell that continuously applies stable pressure, minimizing the impact of patient movement. This stability is crucial for treating auricular

pseudocysts as it effectively prevents cyst wall separation and reduces the risk of recurrence. Conversely, conventional gauze compression bandaging, being softer, is prone to loosening due to patient activity or sweating, which weakens treatment efficacy. Furthermore, frequent adjustments or re-bandaging may be required, increasing the workload for medical staff and causing discomfort to patients.

Limitations analysis

Technical requirements for operation: While plaster compression bandaging demonstrates clear therapeutic advantages, it imposes higher technical demands on operators. Tasks such as shaping, sizing, soaking time control and precise molding require medical personnel to possess advanced professional skills. Improper operation may result in uneven pressure distribution or complications such as skin ulcers or circulatory disorders. Thus, enhancing technical training for medical staff and establishing standardized operating procedures are essential to improving treatment outcomes.

Patient comfort: Plaster compression bandaging may cause discomfort due to heat or a foreign body sensation, particularly in hot weather or when patients sweat excessively. Additionally, removing the plaster may pull on hair, potentially causing local skin damage or pain, affecting patient acceptance and compliance. Although conventional gauze compression bandaging offers greater comfort, its limited therapeutic effect may necessitate longer treatment durations or frequent dressing changes, impacting the patient's quality of life.

Directions for improvement and prospects

This study compares two compression bandaging methods, clarifying their differences in treating auricular pseudocysts and providing a theoretical basis for optimizing treatment strategies. Future research could focus on the following areas:

Firstly, integrating the strengths of plaster and gauze compression bandaging, new materials and technologies should be developed. For example, more flexible, breathable and lightweight plaster substitutes could enhance both treatment efficacy and patient comfort.

Secondly, strengthening medical staff training and standardizing operational procedures can reduce complications caused by improper techniques.

Thirdly, auxiliary treatments such as ultrasound therapy or local anti-inflammatory drugs could accelerate inflammation resolution and tissue repair.

Finally, personalized treatment plans tailored to specific patient groups (e.g., children, elderly or those with special occupational needs) could address diverse clinical requirements.

In conclusion, treating auricular pseudocysts requires a comprehensive consideration of healing mechanisms, treatment advantages and limitations and patient-specific needs. Continuous technological advancements and optimized treatment protocols are expected to improve cure rates, reduce recurrence risks and enhance overall patient satisfaction and prognosis^{3,9-11}.

Conclusion

The study demonstrates that plaster compression bandaging is significantly more effective than conventional gauze compression bandaging in treating auricular pseudocysts, as

evidenced by higher cure rates and lower recurrence rates. Its advantages include providing uniform and stable pressure, facilitating cyst wall adhesion and closure and reducing the risks of exudation and recurrence. Regarding safety, no statistically significant differences were observed between the two groups, suggesting that plaster compression bandaging is equally safe as gauze bandaging when properly applied. Overall, considering both therapeutic efficacy and safety, plaster compression bandaging holds substantial clinical value and is particularly suitable for patients prioritizing high cure rates and low recurrence rates. It is important to note that in clinical practice, individual patient conditions and physician judgment should be integrated to optimize material selection and post-treatment care, thereby enhancing patient comfort and ensuring safety.

Author Contributions

Yan Li and Tingle Qi performed the experiments and wrote the article. Shugang Wang performed the experiments. Yan Li and Yonggang Jin revised the article. Yan Li and Shugang Wang designed the study and reviewed the article. All authors read and approved the final manuscript as submitted.

Conflict of interest

The authors declare no conflict of interest.

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