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A Case of Ultrasound-Guided Intervention Therapy for a Beaver Tail Liver with Hepatic Abscess

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Abstract

Objective: To report a case of beaver tail liver accidentally discovered by preoperative examination, and review relevant literature to improve the understanding of the anatomical variation of the liver. **Methods:** Analysis of a case of beaver tail liver incidentally discovered during preoperative examination for hepatic abscess in our hospital in June 2023. Combining domestic and foreign literature, the etiology, clinical manifestations, diagnosis, differential diagnosis, and treatment of beaver tail liver are discussed. **Results:** The patient was admitted due to abdominal pain and fever, with no other specific discomfort. An incidental finding of a beaver tail liver was discovered during imaging examinations. **Conclusion:** The beaver tail liver is a variant in hepatic anatomical morphology with nonspecific clinical manifestations. It is often incidentally discovered through imaging examinations such as ultrasound, CT, or MRI. Treatment is only necessary when the beaver tail liver is associated with hepatitis or tumors; otherwise, it does not require specific treatment.

Keywords

Beaver Tail Liver, Hepatic Abscess

1. Introduction

"Beaver tail liver" is a type of anatomical variation in the liver. After birth, the posterior part of the left hepatic lobe gradually regresses, and the remaining remnants are referred to as the hepatic fibrous appendix or hepatic fibrous tag. Within it, there may be a small amount of liver tissue and wandering hepatic ducts. If there is still intact liver tissue inside, it forms the liver lobe known as the

beaver tail liver. It is characterized by the extension and bending of the left outer edge of the liver towards the left rear, with the tip surpassing the mid-axillary line, partially surrounding the spleen. Its morphology resembles the tail of a beaver, hence the name 'beaver tail liver'. [1]. Previous studies have mainly focused on the anatomy and differential diagnosis of a beaver tail liver. The beaver tail liver is often misdiagnosed due to similarities in sonograms with conditions such as liver cirrhosis, splenic remnants, and perisplenic hematoma. However, cases of a docked liver accompanied by a hepatic abscess are rare. We present a clinical case of a beaver tail liver with a concurrent hepatic abscess that was accidental discovered, and discuss its differential diagnosis.

2. Case Presentation

A 71-year-old female patient presented with a chief complaint of abdominal pain and fever for one day. After initially seeking medical attention at the local health center, she is now admitted to our hospital for further evaluation and treatment. The patient has a history of surgery for varicose veins in the right lower limb and denies any history of hypertension, diabetes, cardiac or cerebrovascular diseases, mental health disorders, or trauma. There is no reported history of medication or food allergies. During physical examination, the patient's examination revealed clear consciousness, voluntary positioning, and cooperative behavior. Skin and mucous membranes showed no signs of jaundice, and no palpable superficial lymph nodes were detected. There were no vascular murmurs in bilateral neck arteries, and lung sounds were clear without apparent dry or moist rales. The heart had a normal size with regular rhythm and no murmurs. Abdominal examination revealed distension, soft texture, generalized tenderness, and rebound tenderness. Bowel sounds were present, and the liver and spleen were not palpable below the ribcage. No edema was noted in the lower limbs. Routine blood tests showed an elevated total white blood cell count of 18.91×10^9/L. Preoperative CT findings indicated the extension of the left outer lobe of the liver, partially encircling the spleen, forming a beaver tail liver. The liver S2 segment showed an ischemic lesion with a suspected infectious or alternative etiology, and cholecystitis was considered (**Figure 1**). The ultrasound examination initially did not reveal any liver lesions. On the following day, a repeat ultrasound identified a lesion in the S2 segment, raising suspicion of an infectious lesion in the S2 segment. Combining various examinations, we diagnosed it as a beaver tail liver with hepatic abscess. Further treatment involved ultrasound-guided liver abscess drainage and contrast-enhanced ultrasound. The contrast-enhanced ultrasound indicated a non-perfused lesion, confirming it as a hepatic abscess. Subsequent drainage placement within the abscess resulted in the extraction of purulent fluid (**Figure 2**), leading to a significant reduction in the size of the lesion after drainage. Postoperatively, the patient experienced noticeable improvement in abdominal pain, a significant decrease in inflammatory markers, and a gradual return to normal body temperature. A follow-up abdominal CT one day after the procedure revealed a significant reduction in the

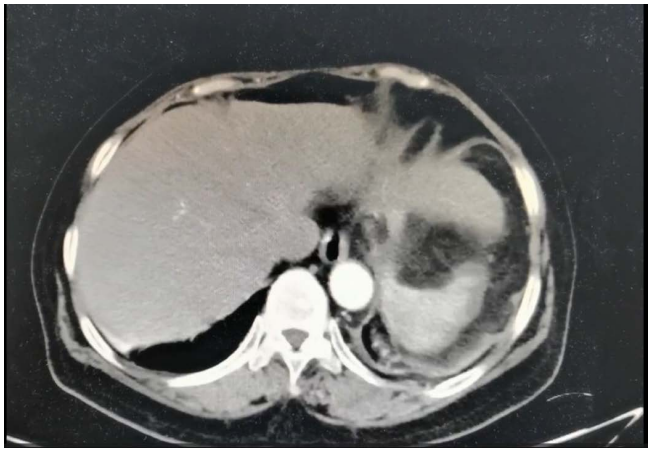

Figure 1. Preoperative CT images: the lesion located in the S2 segment of the liver is displayed.

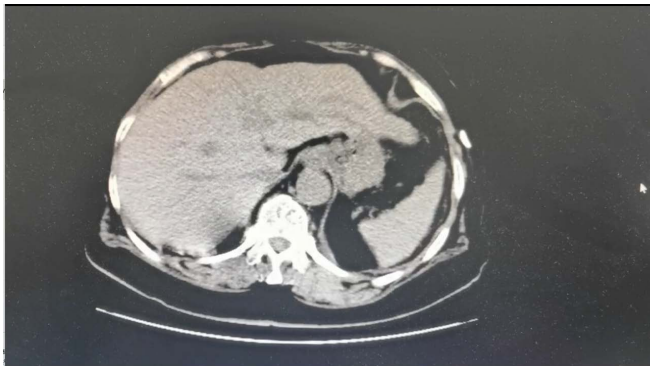

Figure 2. Postoperative CT images: the lesion in the S2 segment has significantly reduced in size.

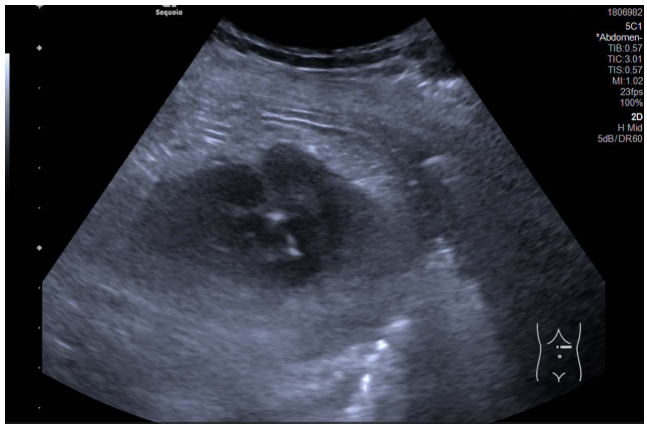

Figure 3. Images during ultrasound-guided catheter drainage procedure.

infectious focus (Figure 3), consistent with the findings from ultrasound. Finally, a three-dimensional reconstruction of the liver clearly showed the leftward extension of the liver's left margin, partially surrounding the spleen, providing more favorable evidence for the diagnosis of a docked liver (Figure 4). On the

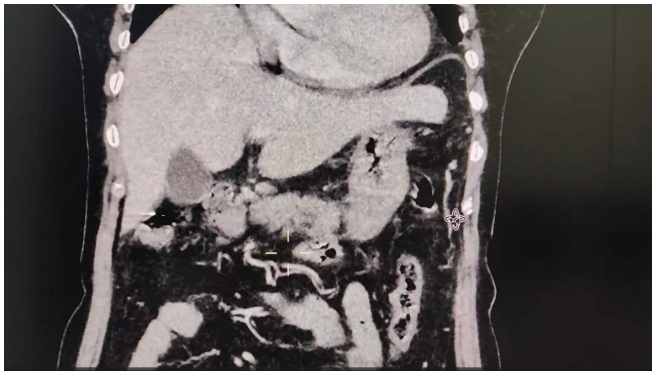

Figure 4. Three-dimensional reconstructed images of the beaver tail liver. Clearly showing the course of the left hepatic lobe.

third postoperative day, the patient was free of any discomfort, with normal inflammatory markers, and the patient was discharged after the removal of the drainage tube.

3. Discussion

The beaver tail liver is a congenital variation of the liver, where in the fetal stage, the liver's nutrition is supplied through the umbilical vein. The umbilical vein, at the division between the left lobes, naturally curves to the right to connect with the portal vein, nourishing both the left and right liver lobes. After birth, the liver's nutrition is supported by the hepatic artery and portal vein, as the umbilical vein closes. The intrahepatic vessels undergo fusion and degeneration, reducing in number. The main angle between the portal vein trunk and its left branch becomes acute, resulting in less vascular supply and developmental growth to the left lobe compared to the right lobe. The posterior part of the left outer lobe gradually degenerates, leaving remnants known as the hepatic fibrous appendix or hepatic fibrous appendage. Within these remnants, there may be a small amount of liver tissue and stray hepatic ducts. If there is still intact liver tissue within these remnants, it forms the liver lobe known as the beaver tail liver, observed in approximately 5% of adults [2].

The beaver tail liver often presents with nonspecific clinical symptoms and is typically discovered through physical examinations or relevant investigations when combined with other diseases. The diagnostic key points include [3]: 1) Extension and bending of the left outer edge of the liver to the left and posterior, with the tip surpassing the midaxillary line; 2) The extended portion of liver tissue is connected to the normal left outer lobe vessels, exhibiting similar density and signal intensity on plain and enhanced scans compared to the rest of the liver tissue; 3) The left lobe fissure is located to the right of the vertebral body edge (indicating that the beaver tail liver is only related to the left outer lobe rather than the entire left liver lobe enlargement); 4) The connection point of the extended portion with the left outer lobe may be relatively narrow. Among these four diagnostic criteria, 1), 2), and 3) are essential conditions, and 4) is an aux-

iliary condition [4]. The diagnosis of the beaver tail liver mainly relies on the combination of CT, MRI, and ultrasound from multiple perspectives, especially the three-dimensional reconstruction of CT, which can clearly display the surrounding anatomical structures and differentiate it from other diseases.

The beaver tail liver often needs to be differentiated from liver cirrhosis, residual spleen, compensatory enlargement of the accessory spleen, lobulated spleen, splenic tumors, and perisplenic hematoma. 1) Liver enlargement caused by cirrhosis is generally uniform, with no relative narrowness, posterior bending, or encircling of the spleen. Cirrhosis patients also exhibit morphological abnormalities such as widened liver fissures, pseudo-lobule formation, and cirrhotic nodules due to hepatocyte necrosis, collapse of the lobular structure, and diffuse proliferation of fibrous tissue. Advanced cirrhosis can manifest as functional impairment, jaundice, abnormal coagulation function, and complications like esophageal-gastric varices, splenomegaly, splenic hyperfunction, and ascites due to increased portal vein pressure, hindrance of venous return from the gastrointestinal tract and spleen, leading to the opening of collateral circulation [5]. 2) The differentiation of the beaver tail liver from residual spleen and compensatory enlargement of the accessory spleen: Residual spleen usually has a history of splenectomy, and its existence is discovered through relevant imaging examinations postoperatively. Compensatory enlargement of the accessory spleen appears as increased parenchyma within the accessory spleen, presenting as round or oval nodular changes [6]. 3) Clinical cases of splenic tumors are extremely rare, with a low reported incidence in domestic and foreign literature. They exhibit complex pathological classifications, with benign tumors being more common than malignant ones. Splenic tumors typically lack specific clinical manifestations and are often incidentally discovered through imaging examinations. They generally present as round, oval, or irregular-shaped masses within the splenic parenchyma, and secondary splenic tumors are associated with a history of tumors in other parts of the body and are mostly malignant. 4) Lobulated spleen is a developmental anomaly, with each lobe receiving blood supply from the splenic artery, and the parenchymal echoes between the lobes are consistent. 5) Perisplenic hematoma is usually associated with a history of upper abdominal trauma, and imaging examinations reveal crescent or beaver tail-like changes around the spleen. However, there is no obvious blood flow signal within the hematoma, and it is not connected to the left liver. When a beaver tail liver is combined with a hepatic abscess, it is prone to misdiagnosing the lesion. In this case, our ultrasound doctor did not initially detect the liver abscess lesion during the first examination. This was because the left outer lobe of the beaver tail liver extends posteriorly to the front of the spleen, causing what was observed during the initial scan as not being the actual left margin of the liver. It was only after expanding the scanning range during the second examination that the lesion was found. When a beaver tail liver is combined with a liver abscess, especially in the S2 segment, ultrasound doctors should conduct a more com-

prehensive scan to ensure that the scanning range covers the entire liver, avoiding misdiagnosis.

In summary, the beaver tail liver is a congenital anatomical variation in the liver's morphology. It is often incidentally discovered through imaging examinations, typically lacks specific clinical manifestations, and poses no harm to the body. Treatment is only necessary if the beaver tail liver is associated with hepatitis or tumors. On its own, it does not require specific medical intervention. Ultrasound examination can accurately diagnose the presence of beaver tail liver and other associated lesions. This relies on the doctor's experience in promptly recognizing the presence of beaver tail liver and conducting a comprehensive scan of the liver.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Clinical Analysis of 137 Cases of Fungal Keratitis

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Abstract

Objective: To analyze the epidemiology, clinical diagnosis and treatment of fungal keratitis (FK) in hospitalized patients at the First Affiliated Hospital of Yangtze University in recent years. **Methods:** A retrospective investigation was conducted on the data of 137 cases of FK in our hospital from January 2019 to December 2022. The epidemiological characteristics, identification results of fungal strains, clinical treatment, and prognosis of the patients were analyzed. **Results:** Among the 137 FK patients, 89 were males and 48 were females, and the ratio of male to female was 1.85:1, The age of onset was the largest number of patients in 50 - 59 years old and 60 - 69 years old. The disease occurred most in autumn, winter and summer farming season (from September to December, January, May, June). 72 cases (52.6%) had a clear history of corneal injury, and 43 cases (31.4%) had a history of plant injury. Other risk factors include eye surface diseases, ophthalmic surgery, and wearing corneal contact lenses. The top three pathogens were *fusarium* (38.7%), *aspergillus* (23.3%), and *alternaria* (17.5%). 101 eyes showed improvement or cure after treatment with medication, 9 eyes underwent corneal stromal injection, 11 eyes were covered with conjunctival flap covering or amniotic membrane transplantation, 12 eyes were covered with corneal transplantation, and enucleation of ocular contents was performed in 4 eyes; Visual acuity was improved or maintained in 123 patients (about 89.8%). **Conclusions:** The incidence of FK in our hospital was mostly middle-aged and elderly men, mostly caused by corneal injury in the process of agricultural labor. The pathogens were mainly fusarium and aspergillus. The preferred treatment was medication, with severe cases requiring combined surgical treatment. Most patients can maintain or improve their vision after treatment.

Keywords

Fungal Keratitis, Retrospective Analysis, Epidemiology, Pathogens

1. Introduction

Fungal keratitis (FK) was a type of keratitis caused by pathogenic fungal, which was an important cause of blindness in corneal diseases in China, especially in areas with low medical care and underdeveloped economies, it often leads to visual loss and was the primary cause of eye removal [1] [2] [3]. The incidence of FK was increasing every year due to corneal injury, especially plant injury, abuse of glucocorticoids, broad-spectrum antibiotics and immunosuppressants, unregulated contact lens wear [4] [5]. According to a study [6], it was estimated that over 1 million eyes were affected by FK worldwide every year, with approximately 10% of patients suffering corneal perforation or requiring eyeball removal. The condition is most prevalent in tropical and subtropical locations and has been estimated to account for 20% - 60% of all culture-positive corneal infections in these climates. The epidemiology of FK varies with regional and climate differences, with *Candida albicans* predominantly found in developed countries and colder regions, while *fusarium* and *aspergillus* were the main pathogens in developing and warm regions. The Jing Zhou region was located in the Jiang Han Plain and grows a variety of crops such as rice, wheat, rape and cotton, FK was easily caused by plant injury during the harvesting season. This study retrospectively analyzed the case data of 137 FK patients in our hospital, providing a basis for clinical diagnosis and treatment of FK in this area.

2. Objects and Methods

2.1. Objects

A total of 452 patients (452 eyes) with FK in the First Affiliated Hospital of Yangtze University from January 2019 to 2022 were retrospectively collected, including 137 patients (137 eyes) with positive fungal culture. The pathogenetic diagnostic criteria were based on any of the following: 1) corneal ulcer curettage or biopsy of corneal tissue from the edge of the lesion, and the hyphae or spores was detected by microscopic of 100 g/L potassium hydroxide smears 2) corneal scrapings with positive fungal culture; 3) fungal hyphae or spores were observed by confocal microscopy; 4) If the pathogenetic results are negative, the clinical diagnosis of FK was mainly based on the patient's symptoms and signs consistent with the performance of FK. Symptoms such as ocular redness, eye grinding, photophobia, tears, blurred vision, and corneal ulcer with white or milky dense toothpaste like and lichen like appearance, with or without immune rings, satellite foci, pseudopodia, hyphema, corneal perforation, etc was found in eyes, and empirical antifungal drugs were effective. This study was approved by the hospital ethics committee.

2.2. Methods

2.2.1. Laboratory Examination Methods

1) Corneal scraping: after the patients were anaesthetized with proparacaine hydrochloride eye drops, the patients were operated under an operating micro-

scope, firstly, the necrotic tissue on the surface of the ulcer was scraped off. Then, then an appropriate amount of tissue was scraped from the basal layer and the edge of the ulcer with a razor blade, and then applied to slides, which were immediately sent to microbiology laboratory for 10% potassium hydroxide (KOH) wet film microscopic examination. 2) Fungal culture and identification: Scrape corneal tissue using the same method, immediately inoculated with Sabouraud dextrose agar, and send to the microbiology laboratory in 35˚C culture, daily observation of the agar whether there was fungal growth. If fungal growth was found, the colonies will be stuck with tape and identified under microscope after staining with lactic acid gossypol blue.

2.2.2. Drug Treatment

1) Corneal ulcer debridement: after surface anaesthesia, carefully scrape off the corneal ulcer Lesion with a blade under the microscope, avoiding damage to the normal corneal epithelium, and rinse the conjunctival sac with saline. Debridement should be performed once every 2 - 3 days until the wound surface improves significantly. 2) Drug treatment: When patients were highly suspected or diagnosed with FK, systemic and local antifungal therapy was given, including intravenous infusion of fluconazole injection or oral itraconazole capsules, eye drops of azoles (such as voriconazole eye drops, fluconazole eye drops), and polyene drugs (such as natamycin eye drops), assist with non-steroidal anti-inflammatory drugs (such as pranoprofen eye drops), antibacterial drugs (such as levofloxacin eye drops or tobramycin eye drops), if necessary, combine with dilaters (such as compound topicamide eye drops).

2.2.3. Surgical Treatment

1) Corneal stromal injection: On the basis of corneal ulcers debridement, voriconazole (0.5 mg/mL) or amphotericin B (0.1 mg/mL) was extracted with an insulin syringe. The needle was inserted into the transparent area of the cornea at a distance of 1.5 mm next to the lesion, with the tip pointing to the center of the lesion, then the medication was slowly pushed into the stroma of the cornea, the cornea could be seen to be white from oedema, and a total of 1 - 5 points could be injected, according to the scope of the lesion. The injection can be repeated according to the condition, and regular follow-up examinations can be conducted. 2) Other surgical methods: For patients who were not well treated with medication alone, combined surgical treatments were needed, including conjunctival flap masking or amniotic membrane transplantation and corneal transplantation. Additionally, enucleation of eyeball may be performed due to severe endophthalmitis, ulcer perforation.

2.2.4. Analysis Methods

Clinical data such as gender, age, month of high disease prevalence, onset triggers, visual acuity changes, fungal culture results, and treatment protocols of the patients were recorded and analyzed during their hospitalization.

3. Results

3.1. Gender and Age

Among 137 FK patients (137 eyes), 89 were males and 48 were females, the ratio of male to female was 1.85:1, the average age was 55.6 ± 11.7 years (21 - 81 years), 3 cases were 20 - 29 years old, 11 cases were 30 - 39 years old, 19 cases were 40 - 49 years old, 42 cases were 50 - 59 years old, 39 cases were 60 - 69 years old, and 12 cases were over 70 years old. The highest incidence of the disease was 50 - 69 years old (60.7%) (Figure 1).

3.2. Months of High Disease Incidence

The incidence of the disease in autumn and winter seasons (September to December, January) and the busy summer farming season (May to June) accounted for 83.2% of the year. The top four months were October (24 cases), June (20 cases), September (19 cases) and May (17 cases) (Figure 2).

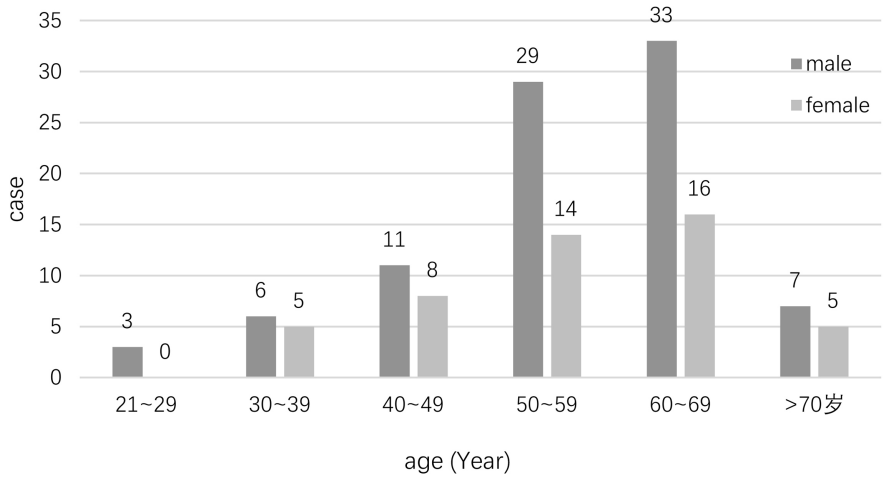

Figure 1. Age and sex distribution of patients with fungal keratitis.

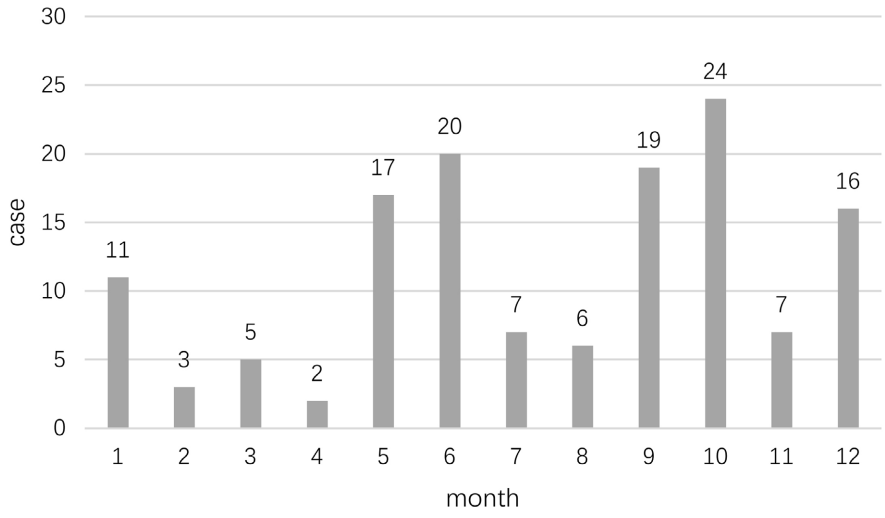

Figure 2. Distribution of visit time for fungal keratitis.

Table 1. Distribution of pathogens in patients with FK.

Pathogen	Cases	Percentage (%)
Fus spp	53	38.7
F. solani	29	21.2
F. oxysporum	17	12.4
others *Fus*	7	5.1
Asp spp	32	23.3
A. fumigatus	14	10.2
A. flavus	12	8.7
A. terreus	3	2.2
others *Asp*	3	2.2
Alternaria spp	24	17.5
Candida spp	11	8.1
others fungi	17	12.4

3.3. Risk Factors for Morbidity

In 137 eyes, 72 eyes (52.6%) had a definite history of trauma, of which 43 eyes (31.4%) had a history of plant trauma. 29 eyes (21.2%) had a history of associated ocular surface disease. 5 eyes (3.6%) were infected after ophthalmic surgery. 5 eyes (3.6%) were infected after contact lens wear. 3 eyes (2.2%) had a history of ocular substance abuse. Other unknown causes were present in 23 eyes (16.8%). A total of 27 eyes (19.7%) of all patients had a history of diabetes.

3.4. Distribution of Pathogens

343 FK patients were confirmed, but only 137 of them were positive for fungal culture, with a positive rate of 39.9%. The main pathogens were *fusarium*, *aspergillus*, and *alternaria*, as shown in Table 1.

3.5. Efficacy

All patients underwent corneal ulcer debridement, and visual acuity could be maintained or improved in 123 eyes (89.8%). 101 eyes were improved or cured by medication (natamycin eye drops, systemic antifungal therapy was given to those with severe conditions). After corneal injection of voriconazole or amphotericin B, the condition was stabilized in 9 eyes, conjunctival flap covering or amniotic membrane transplantation was performed in 11 eyes, and corneal transplantation was performed in 12 eyes. Finally, 4 eyes underwent enucleation, 3 eyes were infected with *aspergillus*, and 1 eye was infected with *fusarium*.

4. Discussion

FK was increasingly becoming the main cause of corneal blindness in developing countries due to its poor response to drugs [4]. Our region was located in the

Jiang Han Plain, with high precipitation, humid climate, rich vegetation, and dense distribution of water resource, which was a favourable environment for fungal growth. Corneal plant injury was more common due to the predominantly agricultural population, but the economic conditions were relatively low, resulting in relatively backward timeliness and accuracy of diagnosis and treatment [7].

Early diagnosis and treatment of FK was crucial for the prognosis of the disease. Traditional diagnostic methods, including microscopic examination of corneal scraping and culture of isolated fungal hyphae, had always been the gold standard for laboratory diagnosis of FK. As the culture of fungi was very time-consuming, it tends to delayed treatment and lead to false-negative results [8] [9]. Although corneal scraping examination can quickly obtain results, in cases of deep corneal infection, the superficial cornea sample may not contain fungal components. In addition, it was an invasive procedure with a poor patient experience, which was inappropriate for patients with near-perforation of the cornea. The recently developed cornea confocal microscopy was a supplementary diagnostic method for detecting fungi, which allows for non-invasive and direct visualization of potential fungal pathogens, enabling rapid and real-time diagnosis [10]. A study [11] has shown that the positive rate of FK detection was 88.8% using confocal microscopy, which was significantly higher than corneal scraping examination. The sensitivity and accuracy of confocal microscopy in the diagnosis of infectious keratitis had also been confirmed in many publications [12] [13]. However, the instrument was expensive and its application was limited in primary hospitals. Therefore, in order to improve the detection rate of FK, clinical doctors in our hospital directly inoculate corneal scrapings onto Sabouraud dextrose agar and applied to slides at the bedside, and send them directly to the laboratory within 2 hours, ensuring the timeliness of microscopy and culture.

This study shows that the age of FK in Jing Zhou was mainly concentrated between 50 and 69 years old, and the majority patients were male, with farmers as their main occupation, confirming once again that farmers were still the main occupation among FK patients. On the other hand, it indicated that young people were working in the cities, and those engaged in agriculture in the countryside were mainly middle-aged and old people. These people were prone to plant injury during agricultural work, and the symptoms were relatively mild at the early stage of infection. Due to their own cultural level and economic ability, they often failed to consult the doctor in time after infection, missing the critical period of early diagnosis and treatment, which may lead to severe fungal corneal infections, resulting in a poor prognosis or even enucleation of the eyeballs. The onset season was mainly concentrated in May to June and September to December, which may be related to the busy agricultural season during these two time periods. The risk factors for FK infection also include wearing corneal contact lenses, eye surface diseases, ophthalmic surgery, and misuse of eye medications.

These patients were prone to corneal damage and infection. Diabetes patients should pay attention to FK. Some studies have shown that diabetes can aggravate FK infection and affect prognosis [14].

The top three pathogens were *Fusarium*, *Aspergillus*, *Alternaria*, which were consistent with other literature reports [2] [15] [16], but also inconsistent with other studies showing that *Aspergillus* ranks the first [11] [17], indicating that there were geographical differences in the pathogens of FK in China. The clinical characteristics, treatment methods, and outcomes of keratitis caused by different fungal genera were different, which were related to the different growth modes of mycelium in the cornea and the immune status of the organism. The growth mode of *Fusarium* in the cornea was parallel growth, which can easily cause the area of ulcer to expand. The formation of mycelial tundra was thicker and easy to prevent the infiltration of drugs [18], and the mycelium that invaded the corneal tissue will appear mycelium wall thickening. This structure enhanced the pathogenicity and drug resistance of *Fusarium* genus, making treatment more challenging. *Aspergillus* grow vertically or diagonally in the infected cornea and secretes enzymes that degrade collagen fibers, making it more prone to corneal fusion, corneal perforation, fungal endophthalmitis, leading to a poor clinical prognosis and low drug cure rate. This was also the main reason for enucleation of the eyeball in FK patients. *Alternaria* has no membrane and low pathogenicity, the area and depth of corneal ulcers caused by *Alternaria* were smaller than *Fusarium* and *Aspergillus*, and were sensitive to various antifungal drugs. Its treatment was mainly drug therapy, with a high clinical cure rate [19].

The susceptibility of different fungal genus to commonly used antifungal drugs also varies, and the minimum inhibitory concentration (MIC) of *fusarium* to various drugs was higher than that of other genera [18]. Thet Tun Aung [20] found that voriconazole showed better effects than natamycin and amphotericin B in reducing wound size and viable fungal count in FK. Therefore, it was considered that natamycin and voriconazole could be the preferred drugs for empirical treatment [21]. Temporarily formulated 1% voriconazole eye drops can be stored for 30d at room temperature (25˚C ± 2˚C) or refrigerated (4˚C ± 2˚C) protected in the dark. It was worthy of clinical promotion and use. Now there were many new drug in research, such as novel water soluble sterile natamycin formulation, hybrid natural hydrogels, natamycin solid lipid nanoparticle, which also achieved good results. In addition, as a form of drug treatment, intracorneal stromal injection can achieve good therapeutic effects, with a success rate of 95% [22]. In this study nine eyes were injected into the cornea and all of them were all cured. When the effect of drug treatment was poor or even worsens, surgery should be combined as soon as possible, including conjunctival covering, amniotic membrane transplantation, corneal transplantation.

There were some limitations. The positive rate of fungal culture in FK was low, which needs to be further strengthened. Meanwhile, the sample size of this study is relatively small.

In summary, FK patients in our hospital were more common in the middle-aged and elderly population, and mostly of them were caused by plant injury in the process of farming, with *Fusarium* and *Aspergillus* as the main causes. Treatment was based on drug therapy, with natamycin or voriconazole as the first choice of drug therapy, combined with surgical treatment can also achieve good effects. It was necessary to strengthen the health education of patients and the diagnosis and treatment abilities of primary ophthalmologists on FK, early diagnosis and treatment should be made as far as possible, so as to avoid patients' vision loss or even eyeball enucleation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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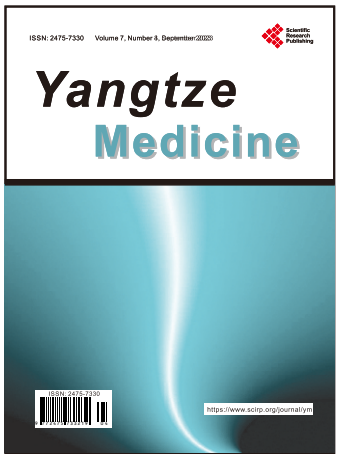

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