Yolk Sac Tumor (Endodermal Sinus Tumor) with Component of Mature Cystic Teratoma at Sacrococcygeal Region in Children less than Two Years - A Case Series

Tanvi Aggarwal[*], *Charanjeet Ahluwalia*[**], *Sonam Sharma*[***], *Amit Kumar Yadav*[****], *Sufian Zaheer*[*****]

Abstract

Sacrococcygeal germ cell tumors in neonates and infants are always primary. About 75-95% of the cases occur in females. Chromosomal analysis of these extragonadal teratomas suggest that they arise from postmitotic/ premitotic cells. The majority of sacrococcygeal tumors are benign, teratomas. These benign teratomas have potential for malignant transformation. The most common malignancy which can occur is yolk sac tumor (YST) also known as endodermal sinus tumor (EST). Malignant germ cell tumors account for 3% of childhood neoplasms and extragonadal germ cell tumor constitutes 1–5% of all germ cell tumors which are highly aggressive. Presented here are three cases of yolk sac tumor arising in a sacrococcygeal mature cystic teratoma in less than 2 years of age.

Keywords: Endodermal sinus tumors, Mature cystic teratoma, Sacrococcygeal region.

Introduction

Sacrococcygeal teratomas are most common type of extragonadal germ cell tumors diagnosed in neonates, infants and children less than 4 years of age.[1] Females are affected more frequently with a female to male ratio of almost 4:1.7.[2] Sacrococcygeal teratoma are benign 75% of the time, malignant and life-threatening 12% of the time and remainder are considered immature teratomas that share benign and malignant features. Benign sacrococcygeal teratomas are more likely to develop in children less than 5 months and older children are more likely to develop malignant sacrococcygeal teratoma. The incidence of malignancy in the neonatal period is approximately 10% and is almost 100% at the age of 3 years.[2]

Malignant component usually observed is yolk sac tumor and these malignant germ cell tumors constitute about 3% of childhood neoplasms,[3] out of which sacrococcygeal yolk sac tumors are extremely rare and aggressive with only few cases reported in the literature.[4] Typically, they are found in the midline. The most common extragonadal sites are sacrococcygeal, mediastinal, intracranial, and retroperitoneal.[5] The authors present three cases of sacrococcygeal yolk sac tumor arising in a previously diagnosed mature cystic teratoma.

Case Reports

Case 1

A 13-month-old female presented with recurrent lump in sacrococcygeal region. Ultrasound findings showed a pelvic mass in relation to the sacroccyx. The clinical diagnosis was sacrococcygeal teratoma initially. It recurred after 5 months. Serum AFP levels were elevated-47 ng/mL (normal range: 0-10 ng/mL). They excised the mass and we received a grey white nodular soft tissue mass measuring 3×2×2 cm; cut-sections showed presence of solid and cystic areas.

Case 2

An 18-month-old male presented with recurrent sacrococcygeal mass. The ultrasound examination

[*]Senior Resident, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India.
[**]Associate Professor, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India.
[***]Senior Resident, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India.
[****]Associate Professor, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India.
[*****]Associate Professor, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India.
Correspondence to: Dr Tanvi Aggarwal, 4th floor, Department of Pathology, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi-110002, India. ***E-mail Id:*** tanviaggarwal333@gmail.com

showed solid hypoechoic soft tissue mass in sacrococcygeal region measuring 6×4 cm. Serum AFP levels were elevated 706 ng/mL. Testicular examination was normal. Before recurrence, it was histopathologically diagnosed as benign teratoma. It recurred after 8 months and we received a skin-covered grey brown soft tissue piece measuring 4×3×2 cm; cut section was grey white homogenous with few cystic area.

Case 3

A 15-month-old male presented with recurrent lower sacrococcygeal mass.

USG examination showed heterogeneous pelvic mass in lower sacrococcyx.

Serum AFP levels were elevated 992 ng/mL.

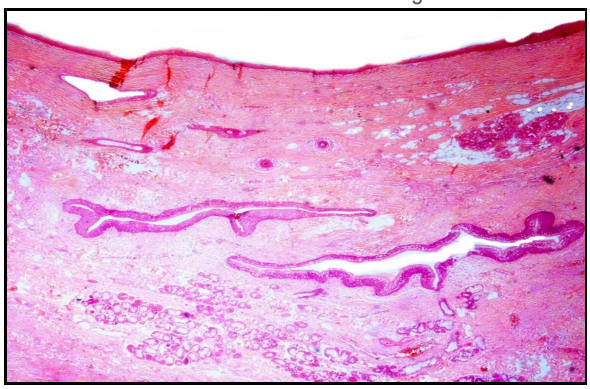

Figure 1.Mature Cystic Teratoma Showing Adnexal Structures and Columnar Epithelium (H & E Stain, x100)

Testicular examination was normal. It was previously histopathologically diagnosed as benign teratoma which recurred after 10 months and came to our department as skin-covered grey brown soft tissue piece measuring 5×4×2 cm. Cut-section was grey white homogenous with few cystic area.

Histopathological examination of all the three cases revealed tumor composed of round to oval cells having mildly pleomorphic, hyperchromatic nuclei and moderate amount of eosinophilic cytoplasm arranged predominantly in microcystic pattern and reticular pattern. Few schiller duval bodies were also identified. Well-vascularized intervening stroma showed myxoid degeneration along with components of mature cystic teratoma showing adnexal structures and columnar epithelium.

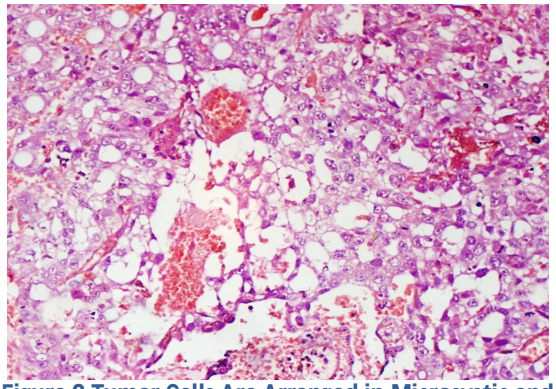

Figure 2.Tumor Cells Are Arranged in Microcystic and Reticular Patterns (H&E, x100)

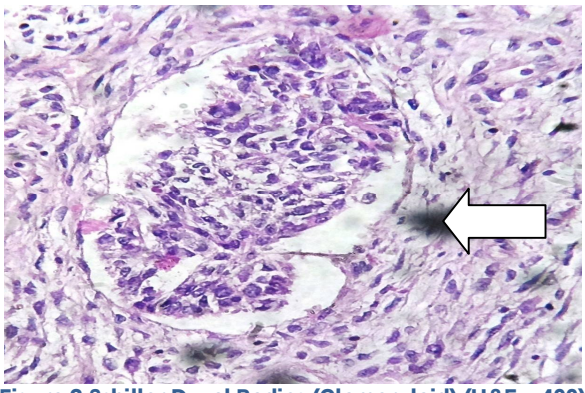

Figure 3.Schiller Duval Bodies (Glomeruloid) (H&E, x400)

So, a final diagnosis of yolk sac tumor with component of mature teratoma, sacrococcygeal region was made. After the diagnosis on histopathology, the authors confirmed it by using immunohistochemical stains which showed positivity for AFP, cytokeratin, AE1/3, PLAP, and negative for EMA. Presence of tumor markers such as serum AFP and serum beta HCG was also done, which aided in making a proper diagnosis.

Discussion

The most common teratomas in infancy are those arising in the sacrococcygeal region.[1] They have an incidence of one in 35,000 to 40,000 live births. Females are affected more frequently with a female to male ratio of almost 4:1.7,8.[2] The most common type is mature teratoma (75%), 12% are malignant and

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remainder are immature teratomas. Malignant germ cell tumors account for 3% of childhood neoplasms. The malignant component usually observed is yolk sac tumor. The YST was first identified as a germ cell tumor by Teilum in 1946.[6] They are uncommon malignant germ cell tumors, which are histologically similar to the yolk sac and its derivatives and, like them, tumor produces alpha-fetoprotein (AFP). Estimation of serum AFP is useful for diagnosis, monitoring the effectiveness of therapy and detection of recurrence prior to clinical manifestation.[7]

The histogenesis of extragonadal EST remains speculative and controversial. Three main hypotheses have been proposed to explain the existence of germ cell tumors in extragonadal sites. The first is an origin from an aberrant differentiation of somatic cells. A further hypothesis is that the tumor originates from germ cells that have been misplaced or arrested in their embryonic migration.[8,9]

Although, most germ cell tumors in children originate in the gonads, the most common primary site for YST is the sacrococcygeal region. Due to the rarity of sacrococcygeal YST, only a few case reports and small series have been reported. So, this is a rare presentation of yolk sac tumor which makes our case interesting and rare as extragonadal GCTs constitute only 1–5% of all GCTs.[10]

An interesting clinical observation is that the large majority of sacrococcygeal teratomas present at birth are benign , whereas tumors in the same general location discovered after the age of 2 months are often malignant.[11] It seems to us that this clinical observation can better be explained by postulating the existence of two groups of teratomas. One arises in the very distant portion of the sacrococcygeal region is, therefore, clinically obvious at the time of birth, and nearly always mature. The other arises more proximally in the retrorectal or adjacent retroperitoneal region, is malignant from the start and grows in the sacrococcygeal area to become clinically evident only sometime after birth, this being responsible for the clinical observation that teratomas associated with marked bowel or bladder dysfunction are often malignant.[12]

As seen in the cases presented here, which presented with recurrent cases of sacrococcygeal teratoma which were histopathologically diagnosed as benign teratoma previously but the mass recurred and was excised after 5, 8 and 10 months respectively showed features of yolk sac tumor which indicates definitely that some malignant transformation has occurred in benign teratoma. Only 7 to 10% of tumors diagnosed before age of 2 months are malignant. However, after 2 months, the incidence of malignancy rises to 66% in boys and 50% in girls. Thus, the sex incidence of malignant lesions is equal or even slightly predominant in male in comparison to the female predominance in all patients with sacrococcygeal teratomas[13] which is similar in the present case.

Malignant conversion of benign teratoma at sacrococcygeal region to yolk sac tumor is rare and has got high aggressive potential. The incidence of teratomas with YST is about 5.8 %.[14]

Management of SCT is mainly surgical. Not only that the earlier the diagnosis, the better the prognosis. But also, earlier the surgical intervention (for neonates diagnosed prenatally), the better the prognosis. Tumor recurrence was reported in 2-35% of patients in different series. Recurrence was due to incomplete resection of the tumor, failure of the en-block removal of the coccyx along with the tumor, tumor spillage or the presence of immature tumors. Mature teratoma should not recur if complete surgical excision and coccygectomy were achieved properly. De Backer et al. reported a recurrence rate ranging between 0 and 26% for mature teratomas and 12 and 55% for immature teratomas in the literature.[15] But in this study, all the three cases were of recurrence and showed malignant conversion to yolk sac tumor showing features of yolk sac tumor (endodermal sinus tumor) with component of mature cystic teratoma. Diagnosis of recurrence in the patients was confirmed by imaging studies, histopathology and using immunohistochemistry.

Normal yolk sac and YST can synthesize keratin, albumin, AFP, alpha1-antitrypsin, transferrin and basement membrane components including fibronectin, type IV collagen, vimentin and laminin.[16,17] In the patients presented here, the tumor cells were positive for AFP, cytokeratin , PLAP, and negative for EMA.

Conclusion

Yolk sac tumors, whether gonadal or extragonadal, are highly aggressive.[6] The authors are presenting this case series of extragonadal teratomas with yolk sac tumor to highlight the early diagnosis and removal of tumor. Though in the sacrococcygeal region, teratoma is the most common tumor, presence of yolk sac tumor element in it is rare and the recurrence of benign cystic teratoma to yolk sac tumor which has occurred in the present cases is even rarer. Combined approach of radioimaging, tumor markers, histopathologic

examination and immunohistochemistry is essential for early diagnosis, treatment and follow up of patient.

This series of extragonadal teratomas with yolk sac tumor is being presented to highlight the early diagnosis and removal of tumor.[18]

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