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Assessment of CD10 in Dentigerous cyst and Ameloblastoma variants

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Abstract

Background: CD10 is a 90- to 110-kd cell surface zinc-dependent metalloprotease glycoprotein with endopeptidase activity. CD 10 protein regulates cell growth and apoptosis thorough signal transduction pathways. It affects invasion and metastatic potential of tumor cells by altering the cellular microenvironment. **Aims and objectives**: To find out the possibility of transformation of dentigerous cyst into ameloblastoma and unicystic ameloblastoma to undergo intraluminal or mural proliferation and the neoplastic potentiality of Dentigerous cyst and local invasion and risk of local recurrence in ameloblastoma variants .

Materials and methods: The study group consisted of total 30 patients in which there were 10 patients of dentigerous cysts, 5 patients of unicystic ameloblastoma, 8 patients of unicystic ameloblastoma with mural proliferation, 7 patients of unicystic ameloblastoma with intraluminal proliferation were included. 3-4 micrometer thick paraffin embedded sections were immunohistochemically stained with antibody against CD10. Then the slides were evaluated to determine the expression of CD10 in the epithelial lining of dentigerous

cyst and in epithelial lining and fibrous wall of unicystic ameloblastoma as well as unicystic ameloblastoma with luminal and unicystic ameloblastoma with mural proliferation.

Results: the present finding suggests that CD10 epithelial expression was negative in majority of dentigerous cyst while UA without proliferation showed low , UA with intraluminal proliferation showed intermediate whereas UA with mural proliferation showed highest expression that suggested the risk of local invasion and recurrence of UA.

Conclusion: The dentigerous cyst does not show potentiality for conversion while UA may convert into variants and from them UA with mural proliferation showed higher proliferative activity with chances of more recurrence as compares to UA with intraluminal proliferation.

Keywords: CD10, Ameloblastoma, Dentigerous cyst.

Introduction

CD10 is a 90- to 110-kd cell surface zinc-dependent metalloprotease glycoprotein with endopeptidase activity, and also called neutral endopeptidase, enkephalinase, neprilysin, and common acute lymphoblastic leukemia antigen (CALLA). **(Iezzi et al, 2008).** CD 10 protein regulates cell growth and apoptosis thorough signal transduction pathways. It affects invasion and metastatic potential of tumor cells by altering the cellular microenvironment **(Anjum et al, 2015) .** Different types of odontogenic cysts and tumors originate from remnants of dental lamina. The capacity for additional proliferation of these epithelial remnants during cyst formation is different and thus cause variations in their biological behavior and molecular expression, due to an unknown mechanism **(De Vicente et al, 2010) .** Odontogenic lesions have different behavior from same lesions in other sites of oral cavity. Some benign odontogenic cysts and tumors have aggressive behavior in their histopathologic features. At that time it needs further studies about the nature and behavior of these lesions Such lesions include dentigerous cyst, unicystic ameloblastoma and solid ameloblastoma **(Tadbir et al, 2013) .** Recent study proposed that CD10 is involved in both proliferation and apoptosis when it is express in cancer cells, while its stromal expression may cause tumor progression **(Shibata et al, 2004) .** The present study was conducted to investigate the expression of CD10 in dentigerous cyst and ameloblastoma variants in regards to find out their expression for neoplastic potentiality of dentigerous cyst and local invasion and risk of recurrence in ameloblastoma variants .

Materials and Methods

The study group consisted of total 30 patients in which there were 10 patients of dentigerous cysts, 5 patients of unicystic ameloblastoma, 8 patients of unicystic ameloblastoma with mural proliferation, 7 patients of unicystic ameloblastoma with intraluminal proliferation were included. Ten normal lymph node (tonsil) taken as positive controls. 3-4 µm thick paraffin embedded sections were immunohistochemically stained with antibody against CD10 using the streptavidin-biotin technique. All slides were reviewed by two reviewer. From each positive section, 5 microscopic fields were analysed for counting of total no.of cells and fields which showed highest immunoreactivity in epithelial and stromal cells were identified by ×40 magnification than the number of positive cells were divided into the total number of cells counted in every field, then after the average of all fields were calculated. The result was multiplied by 100 to find the percentage of positive cells. Data were scored according to **Abdel-aziz's** study as follow:

1. Low: Brown membranous and cytoplasmic staining of stromal cells 10-25%

2. Intermediate: Brown membranous and cytoplasmic staining of stromal cells 25-50%

3. High: Brown membranous and cytoplasmic staining of stromal cells More than 50%.

Statistical analysis: All the data obtained were statistically analysed by Chi-square test.

Observation and Results

In the present study, out of total 30 patients , 10 patients of dentigerous cyst showed that there was negative CD10 epithelial expression in 8(80%) patients while 2 (20%) patients showed low degree of CD10 epithelial expression. All 10(100%) patients of dentigerous cyst , showed high degree of CD10 stromal expression. (Figure 1) In Unicystic ameloblastoma all 5 (100%) patients showed low degree of CD10 epithelial expression and in CD10 stromal expression 4(80%) patients showed low degree and 1(20%) patient showed intermediate degree of stromal expression. (Figure 2) In Unicystic ameloblastoma with intraluminal all 7 patients showed positive CD10 epithelial expression, among them 1(14.28%) patients of each showed low and high degree of epithelial expression whereas 5(71.42%) patients showed intermediate degree of epithelial expression and 5(71.43%) patients showed low degree while 2(28.57%) patients showed intermediate degree of stromal expression. (Figure 3)

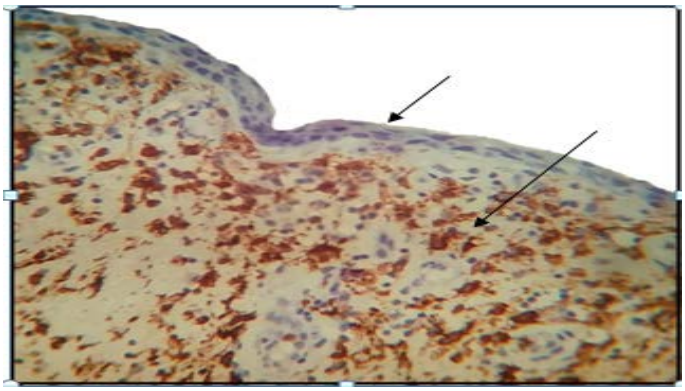

Figure 1: Negative degree of Epithelial & High degree (arrows) of stromal CD10 expression in dentigerous cyst. (40x)

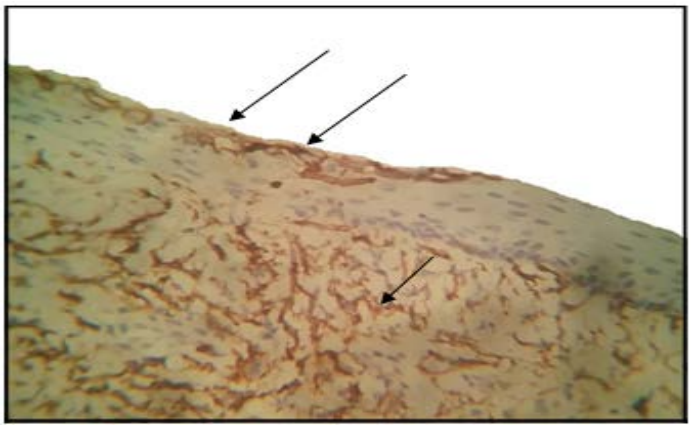

Figure 2: Low degree (arrows) of epithelial and stromal CD10 expression in Unicystic Ameloblastoma (40x)

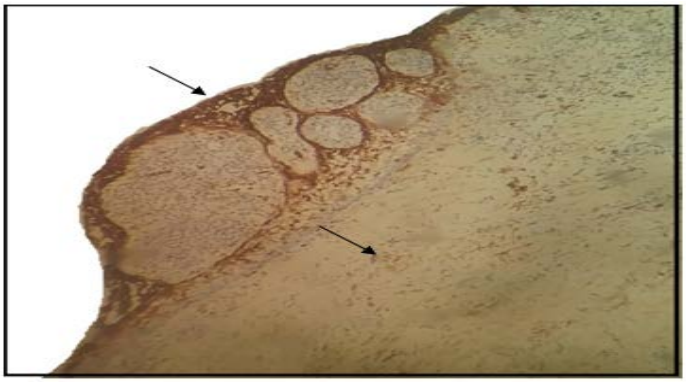

Figure 3 : Intermediate degree (arrows) of epithelial and low degree of stromal CD10 expression in Intraluminal Unicystic Ameloblastoma (40x)

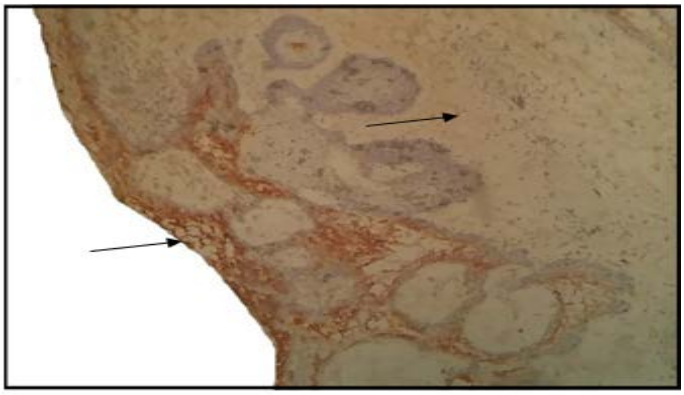

Figure 4 : High degree of epithelial and low degree (arrows) of stromal CD10 expression in Unicystic ameloblastoma with mural proliferation (40x).

Table1 : Comparision of CD10 expression in Dentigerous cyst, Unicystic ameloblastoma, Unicystic ameloblastoma with intraluminal and Unicystic ameloblastoma with mural proliferation

Sr. no.	Lesion	Total	CD10 expression in epithelium				CD10 expression in stroma			
			Negative	Positive			Negative	Positive		
				Low	Intermediate	High		Low	Intermediate	High
1	Dentigerous cyst	10	8 (80%)	2 (20%)	0	0	0	0(0)	0(0)	10 (100%)
2	Unicystic ameloblastoma	5	0	5 (100%)	0	0	0	4 (80%)	1 (20%)	0
3	Unicystic ameloblastoma with intraluminal proliferation	7	0	1 (14.29%)	5 (71.42%)	1(14.29%)	0	5 (71.43%)	2 (28.57%)	0
4	Unicystic ameloblastoma with mural proliferation	8	0	0	1 (12.5%)	7(87.5%)	0	6 (75%)	2(25%)	0
	TOTAL	30	8 (26.66%)	8 (26.67%)	6 (20%)	8(26.67%)	0	15 (50%)	5(16.67%)	10(33.33%)
				22(73.34%)				30(100%)		

Table 2: Comparision of Average of percentage(%) of CD10 positive cells in Dentigerous cyst, Unicystic ameloblastoma, Unicystic ameloblastoma with intraluminal and Unicystic ameloblastoma with mural proliferation

Sr. no	Lesion	Total (30)	Epithelial Expression		Degree of Epithelial expression	Stromal Expression		Degree of Stromal expression
			Average num. of CD10 positive cells	Percentage of average CD10 positive cells		Average num. of CD10 positive cells	Percentage of average CD10 positive cells	
1	Dentigerous cyst	10	0.084	8.4%	Negative	0.692	69.2%	High
2	Unicystic ameloblastoma	5	0.148	14.8%	Low	0.198	19.8%	Low
3	Unicystic ameloblastoma with intraluminal proliferation	7	0.393	39.34%	Intermediate	0.235	23.5%	Low
4	Unicystic ameloblastoma with mural proliferation	8	0.728	72.8%	High	0.248	24.8%	Low

In unicystic ameloblastoma with mural proliferation all 8 patients showed positive CD10 epithelial expression, among them 1(12.5%) patient showed intermediate degree of epithelial expression and 7(87.5%) patients showed high degree of epithelial expression and 6(75%) patients showed low degree and 2(25%) patients showed intermediate degree of stromal expression which was stastically highly significant .(Figure 4)

In the present study, out of total 30 patients CD10 expression in epithelium was negative in 8 (26.66%) patients where in 22 (73.34%) patients, it was positive and among them 8(26.67%) patients each showed low and high degree of epithelial expression while 6(20%) patients

showed intermediate degree of epithelial expression. CD10 stromal expression was positive in all 30(100%) patients and among them 15(50%) patients showed low degree of CD10 stromal expression, 5(16.67%) patients showed intermediate degree of CD10 stromal expression while 10(33.33%) patients showed high degree of CD10 stromal expression. (Table I) In the present study, out of total 30 patients, 10 patients of dentigerous cyst showed 0.084 average num. and 8.4% of CD10 positive cells which was considered as negative expression in epithelium and in stroma 0.692 average num. and 69.2% of CD10 positive cells which was considered as high degree of expression., 5 patients of UA showed 0.148 average num. and 14.8% of CD10 positive cells which was considered as low degree of epithelial expression and in stroma 0.198 average num. and 19.8% of CD10 positive cells which was considered as low degree of expression. 7 patients of UA with intraluminal proliferation showed 0.393 average num. and 39.34% of CD10 positive cells which was considered as intermediate degree of epithelial expression and in stroma 0.235 average num. and 23.5% of CD10 positive cells which was considered as low degree of expression. 8 patients of UA with mural proliferation showed 0.728 average num. and 72.8% of CD10 positive cells which was considered as high degree of epithelial expression and in stroma 0.248 average num. and 24.8% of CD10 positive cells which was considered as low degree of expression.(Table II)

Discussion

CD10 is normally expressed in different cells and tissues, including granulocytes, lymphoid germ cells, anthrocytes, fetal trophoblasts, glandular epithelium of the prostate gland, the epithelium of the gallbladder, myoepithelial cells, Schwann cells, and the epithelium of the renal tubules. it is also expressed in the stromal cells of normal bone marrow and endometrium. Therefore, CD10 might have an important role in the homeostasis, neoplastic changes, and progression of tumors. Based on recent research, expression of CD10 in tumor cells has apoptotic and proliferative roles **(Huang et al, 2005).** CD10 is associated with differentiation and growth of neoplastic cells and CD10 expression is found to be increased with the increase of tumor dysplasia **(Ogawa et al, 2002)**. In 2012, Abdel - Aziz and Amin reported that expression of CD10 is significantly associated with recurrence and might help evaluate the biologic behavior of the tumor. In 2010, Oba et al. reported an increase in the expression of CD10 in malignant melanoma. They concluded that an increase in the expression of CD10 might be used as a marker for tumor progression.

In the present study, 80% patients of dentigerous cyst showed negative epithelial expression while only 20% patients showed low degree of superficial epithelial expression which was in accordance with the findings of **Masloub et al (2011) , Tadbir et al (2013) and Deepa et al (2014).** Epithelial expression of CD10 in variants of ameloblastoma was different. In UA, 100% patients showed low degree of epithelial expression which was much more higher as compared to dentigerous cyst. In UA with intraluminal proliferation 14.29% patients each showed low and high degree while 71.42% patients showed intermediate degree of epithelial expression that also showed higher expression of CD10 as compared to UA. In UA with mural proliferation 12.5% patients showed intermediate and 87.5% patients showed high degree of epithelial expression which was quite higher as compared to UA with luminal proliferation. This subsequent increase in the epithelial expression of CD10 from the UA, UA with intraluminal to UA with mural proliferation might explain the progressive biologic variation of these lesions which was in accordance with the findings of **Masloub et al (2011).** This finding was

also in accordance with the findings of Rosenstein et al (2001) who suggested that the UA and UA with luminal proliferation were non aggressive and could be treated by enucleation whereas the UA with mural proliferation should be treated more aggressively. They concluded that most of the recurrent cases of ameloblastoma were of the mural type.

In the present study, on seeing expression of CD10 in dentigerous cyst, it is negative while in simple UA superficial layer shows CD10 expression which suggested that developmantly both lesions appear as a separate entity. Very few patients of dentigerous cyst in present study showed low expression of CD10 in superficial layer which might be due to that sometimes remanants of stellete reticulum in the reduced enamel epithelium may remain from which dentigerous cyst arises. The unicystic ameloblastoma arise from rest of dental lamina which contains more amount of glycosaminoglycans which is hydrophilic so it pulls water into the superficial epithelial cells of UA that causes stellate reticulum like appearance in suprabasal celllayers so there was that may causes higher expression of CD10 in superficial epithelial cell layer in UA.

Conclusion

CD10 epithelial expression was negative in majority of dentigerous cyst while Unicystic Ameloblastoma without proliferation showed low , with intraluminal proliferation showed intermediate whereas with mural proliferation showed highest expression that suggested the risk of local invasion and recurrence of Unicystic Ameloblastoma.

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