Assessment of color Doppler ultrasonography findings in gynecomastia

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Aims and objectives

Gynecomastia is the proliferation of the ductal and glandular components of the male breast (1). During puberty, the peak frequency usually occurs between the ages of 13 and 14, with as many as 60% of male adolescents being affected (2). There is little information regarding the use of color Doppler US to evaluate gynecomastia. Ramadan et al. (3) found that a diameter of 5 mm was required for the diagnosis of gynecomastia in their study in which the patients were evaluated via ultrasonography (US). They reported positive correlation between Tanner stages established by US (4) and retroareolar tissue thickness. Also, they found positive correlation between the Tanner stages and arterial and venous flow scores.

The effect of vascularity in the development of gynecomastia is unknown. Our aim was to evaluate the color Doppler US findings with regard to gynecomastia to establish whether this could be a viable diagnostic tool.
Methods and materials

Adolescent and teenage male patients who underwent breast US at our department between March 2010 and January 2011 for the evaluation of gynecomastia were included. The study group consisted of 18 male (range 11-18 years; mean age 13.87 ± 1.72) patients with breast enlargement. Thirty-six breasts were examined via gray-scale and color Doppler US by a radiologist. An ACUSON Antares US system (Siemens AG, Erlangen, Germany) with a 13-5 MHz linear array transducer was used to perform the examinations, which were performed with patients in the dorsal decubitus position. Gray-scale US was utilized to detect gynecomastia, and retroareolar glandular tissue thickness was measured. Tanner staging was then evaluated. The color Doppler examination was performed. The transmitted Doppler frequency ranged from 5 to 10 MHz. Arterial flow was based on the number of arteries in which the flow was observed, and the scores were as follows: 0 = no arterial flow, 1 = arterial flow seen in one vessel, 2 = arterial flow seen in two vessels, 3 = arterial flow seen in three or more vessels. Venous flow was also scored using the same system. The resistivity index (RI) was measured at the horizontal line that crosses the nipple and at the medial, lateral and retroareolar regions of the breasts.

Continuous data was expressed as mean ± standard deviation (SD), and categorical data was given as numbers with related percentages (n, %). The differences in the categorical data were analyzed using a chi-square test, and a two-tailed p-value of <0.05 was considered to be statistically significant. The correlations between the arterial and venous flow and the retroareolar glandular tissue thickness along with the mean RI values were analyzed using Pearson's rank correlation coefficient. A correlation was considered to be present when the p value for the difference was less than 0.05. All statistical analyses were performed with the SPSS version 11.01 for Windows software program (SPSS Inc, Chicago, IL, USA).
Results

There were 30 cases of gynecomastia in the 36 breasts, and it was bilateral in 12 of the patients. The retroareolar thickness was $8.03 \pm 5.33$ mm (range 3-25 mm). Arterial flow was detected in 22 (73.3%) of the cases, and 17 (56.7%) had venous flow. Seven patients had an arterial flow score of 1 (23.3%), two had a score of 2 (6.7%), and 13 had a score of 3 (43.3%), and this was most commonly observed in the retroareolar ($n = 15, 50\%$) region. In addition, arterial flow was found in the medial region in 13 (43.3%) breasts and in the lateral region in 13 others (43.3%). Regarding the venous flow scores, six patients had a score of 1 (20%), 10 had a score of 2 (33.3%), and one patient had a score of 3 (3.3%). The average mean RI values of the three breast regions containing vascularity was $0.62 \pm 0.084$ (range 0.47-0.83), with values of $0.66 \pm 0.11$ in the medial region, $0.58 \pm 0.10$ in the lateral region, and $0.64 \pm 0.12$ in the retroareolar region. There was no correlation between the arterial and venous flows and retroareolar glandular tissue thickness ($p > 0.05$). Five (16.7%) breasts were in Tanner stage II, eight (26.7%) were in Tanner stage III, 10 (33.3%) were in Tanner stage IV, and seven (23.3%) were in Tanner stage V, and there was a positive correlation between the mean RI values of the three breast regions and the Tanner stages ($r = 0.41, p = 0.439$). Moreover, the arterial and venous flow scores were strongly positively correlated with the Tanner stages ($r = 0.756; p = 0.000$ and $r = 0.506; p = 0.04$, respectively) (Figure 1, 2).
**Fig. 1**: Figure 1. Gray Scale US of the right breast of a 14-year-old male patient with gynecomastia with an arterial flow score of 3 and a venous flow score of 2 who was Tanner stage V.

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**Fig. 2:** Figure 2. Color Doppler US of the right breast of a 14-year-old male patient with gynecomastia with an arterial flow score of 3 and a venous flow score of 2 who was Tanner stage V.

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**Fig. 3:** Figure 3. Gray scale US of the left breast of the patient with an arterial flow score of 3 and a venous flow score of 2 who was Tanner stage V.

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**Fig. 4:** Figure 4. Color Doppler US of the left breast of the patient with an arterial flow score of 3 and a venous flow score of 2 who was Tanner stage V.

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Conclusion

We believe that our results clearly show that vascularity is correlated with breast development in patients with gynecomastia. Furthermore, it is possible that the RI could be as important as US in the establishment of Tanner stages. However, future studies with larger patient groups should be undertaken to define other potential diagnostic color Doppler US tools.

