The Vaginal Maturation Index as a marker of local sensitivity to estrogens in girls with congenital adrenal hyperplasia (CAH) during puberty

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Background

Introital stenosis is the main complication of vaginoplasty in females with CAH which could result from poor estrogenization of vaginal tissue during puberty.

Objective

To evaluate the maturation of vaginal mucosa depending on the degree of compensation.

Subjects and Methods:

19 adolescent girls with CAH (salt-wasting (SW) - 9, simple virilizing (SV) – 10; 15.9 years (14.4, 16.9), Tanner 4 (3, 5)) were divided into two groups according to the mean serum 17-hydroxyprogesterone (17-OHP), testosterone (Ts) levels and regularity of menstrual cycle during last year: Group 1 - satisfactory compensation (n=10, regular/irregular cycle – 6/4); Group 2 - inadequate compensation (n=9, regular cycle/primary amenorrhea/secondary amenorrhea = 2/3/4) (Tabl. 1). The control group 3 included 12 age-matched healthy adolescent girls with regular menstrual cycle. Cytological examination of vaginal smears with the determination of Vaginal Maturation Index (VMI = (% Intermediate cells × 0.5) + % Superficial cells) and Atrophic Index (AI, % parabasal cells)) has been performed.

Table 1. Clinical characteristics of patients with satisfactory (group 1) and inadequate compensation (group 2)

|	Group 1 (n=10)	Group 2 (n=9)	p
SW/SV	5/5	4/5	
Age (years)	15.9 (14.9, 16.9)	15.8 (14.7, 17.2)	NS
Tanner stage	4 (3, 5)	4 (3, 4)	NS
Menstrual cycle	regular – 6 oligomenorrhea-4	regular-2 primary amenorrhea-3 secondary amenorrhea-4	0.0015
17-OHP (nmol/l)	10,6 (2.45, 25.9)	110 (94.6, 164.9)	0.04
Ts (nmol/l)	0,9 (0.58, 1.65)	4.2 (2, 7,1)	0.0038
Estradiol (pmol/l)	157.8 (121.5, 201)	168 (133, 226.7)	NS
Ovarian volume, cm^3	6.35 (4.46, 10.3)	8,6 (6.32, 12.9)	NS

Results:

Serum Ts level negatively correlated with VMI (r_s = -0.58, p = 0.008) and positively correlated with AI (r_s=0.51, p=0.024) in total CAH group (Pic. 2). No significant correlations were observed between indices and serum estradiol and 17-OHP levels. In group 1 VMI was significantly higher than in group 2 (62.5% (56, 64.5) vs. 48.3% (43.2, 53.75), p = 0.002). No significant difference of VMI was revealed between group 1 and group 3 (Pic.1, 3, 5). Parabasal cells were found in 5 girls from group 2 (AI = 3.5% (0.0, 20.0) vs 0.0% (0.0, 0.0) in group 1). The significant difference of AI was observed in group 2 between SW and SV form (20.25% (10.0, 33.75) vs. 0.0% (0.0, 3.5), p = 0.04) (Pic. 4, 6).

Conclusion:

The estrogenization of vaginal tissue mainly depends on the compensation of CAH. Epithelium maturation is reduced more in SW in comparison to the SV form.

Pic.1 The Vaginal Maturation Index (VMI) in group 1 (satisfactory compensation of CAH), group 2 (inadequate compensation of CAH) and in control group 3 (healthy adolescent girls)
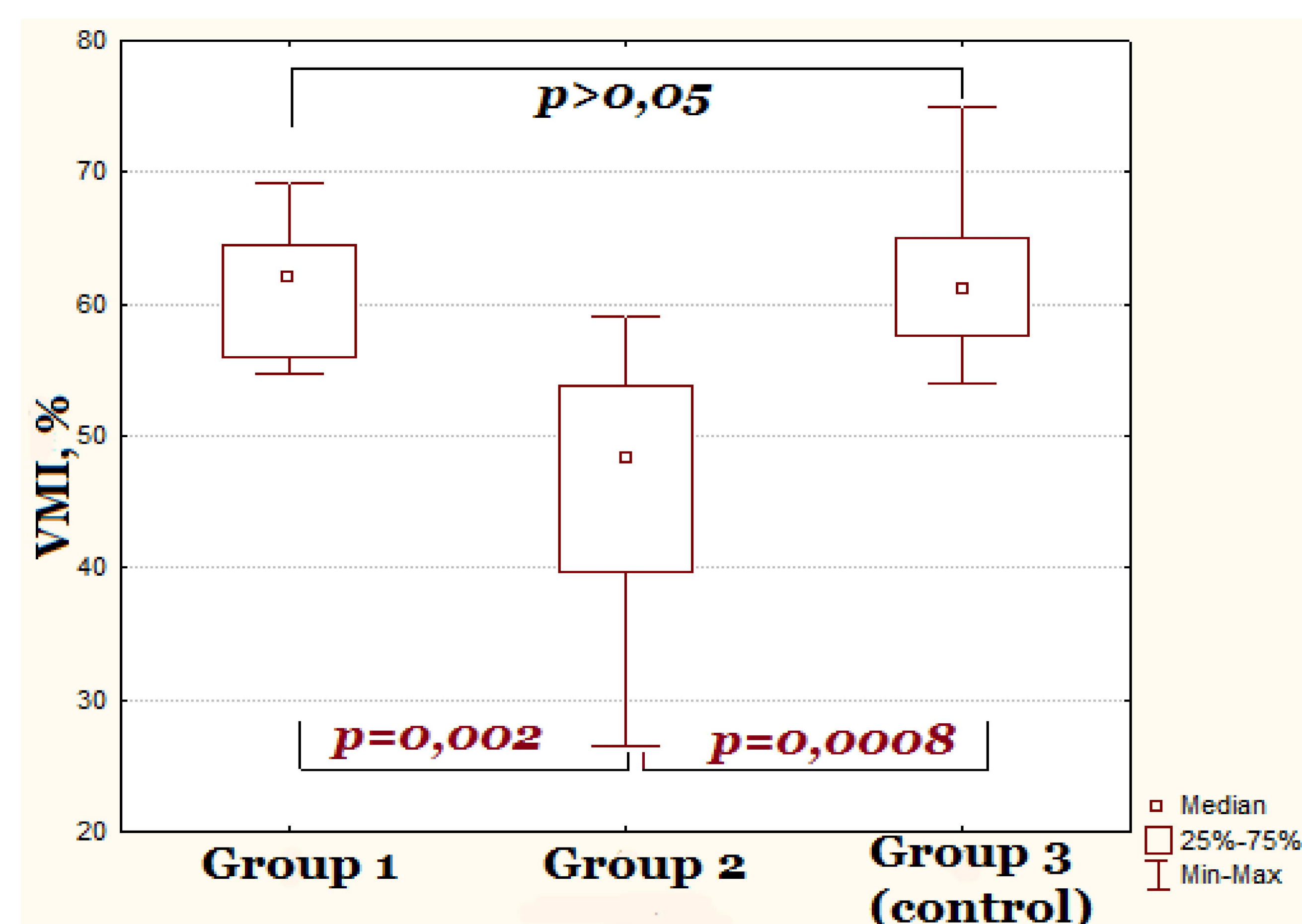

Pic.2 Correlation between the Vaginal Maturation Index (VMI), the Atrophic Index (% parabasal cells) and serum testosterone levels in adolescent girls with CAH
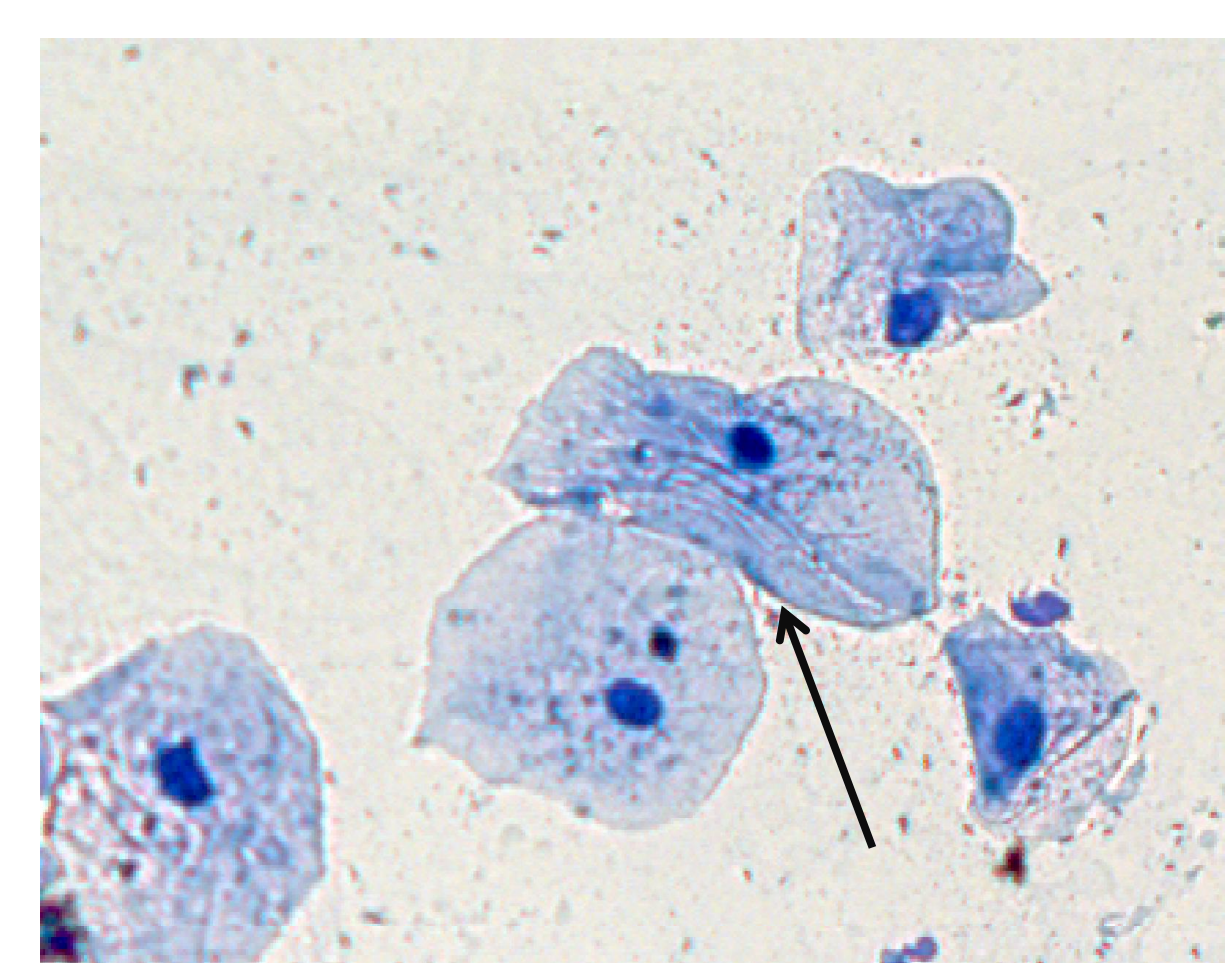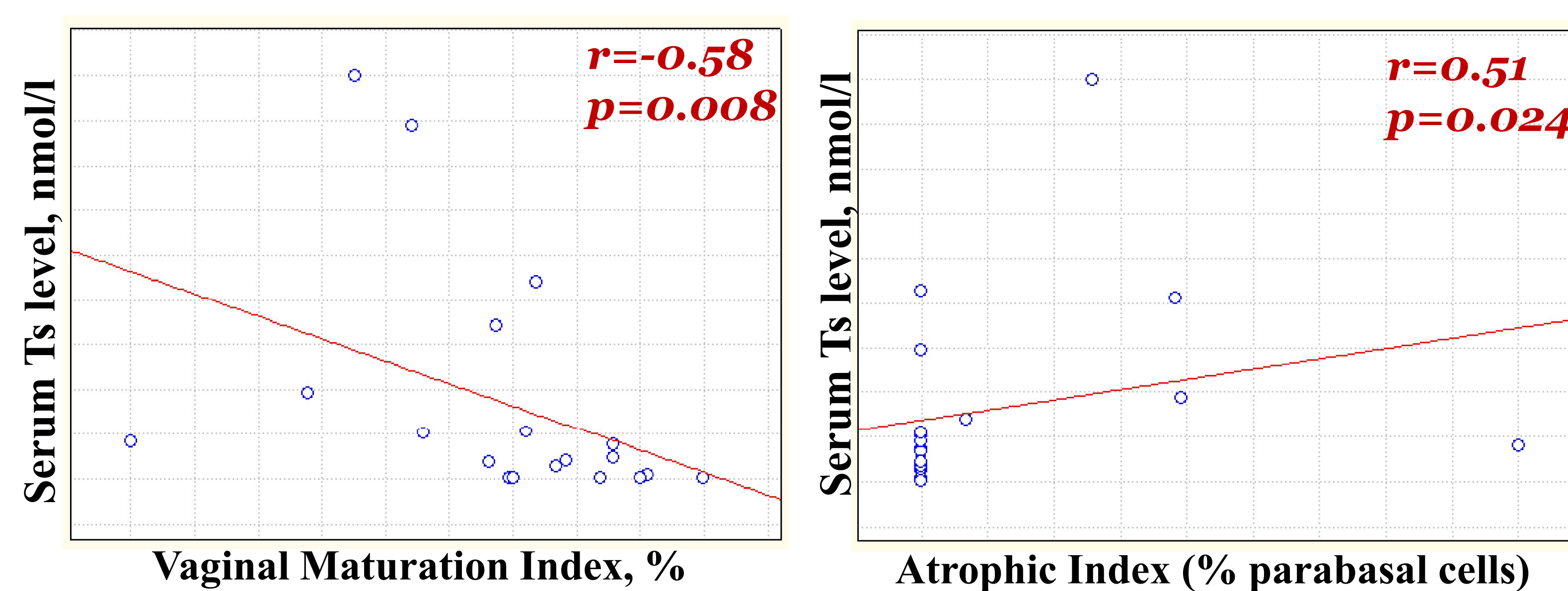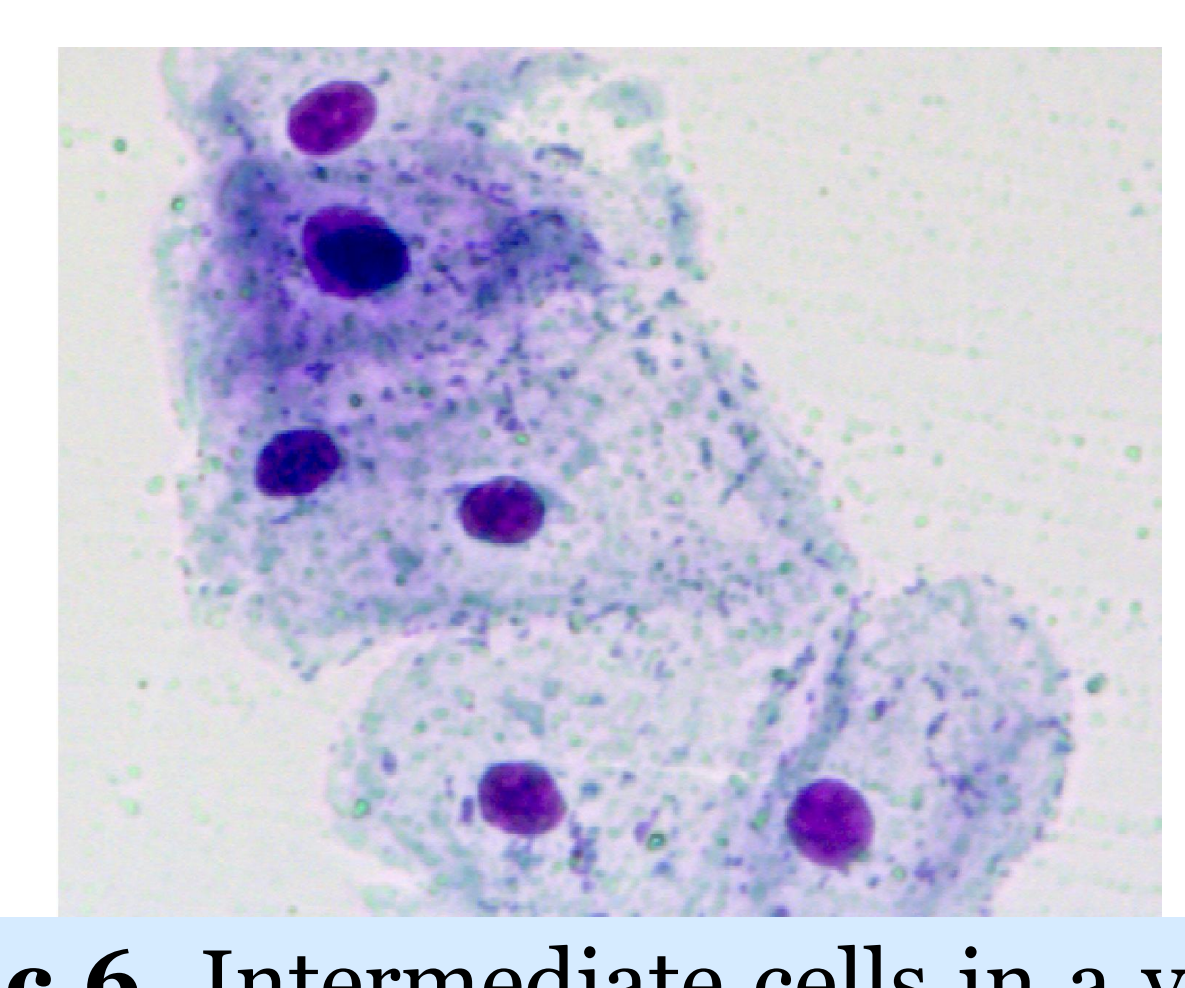

Pic.3. Intermediate and superficial (arrow) cells in a vaginal smear of adolescent girl with **satisfactory compensation**
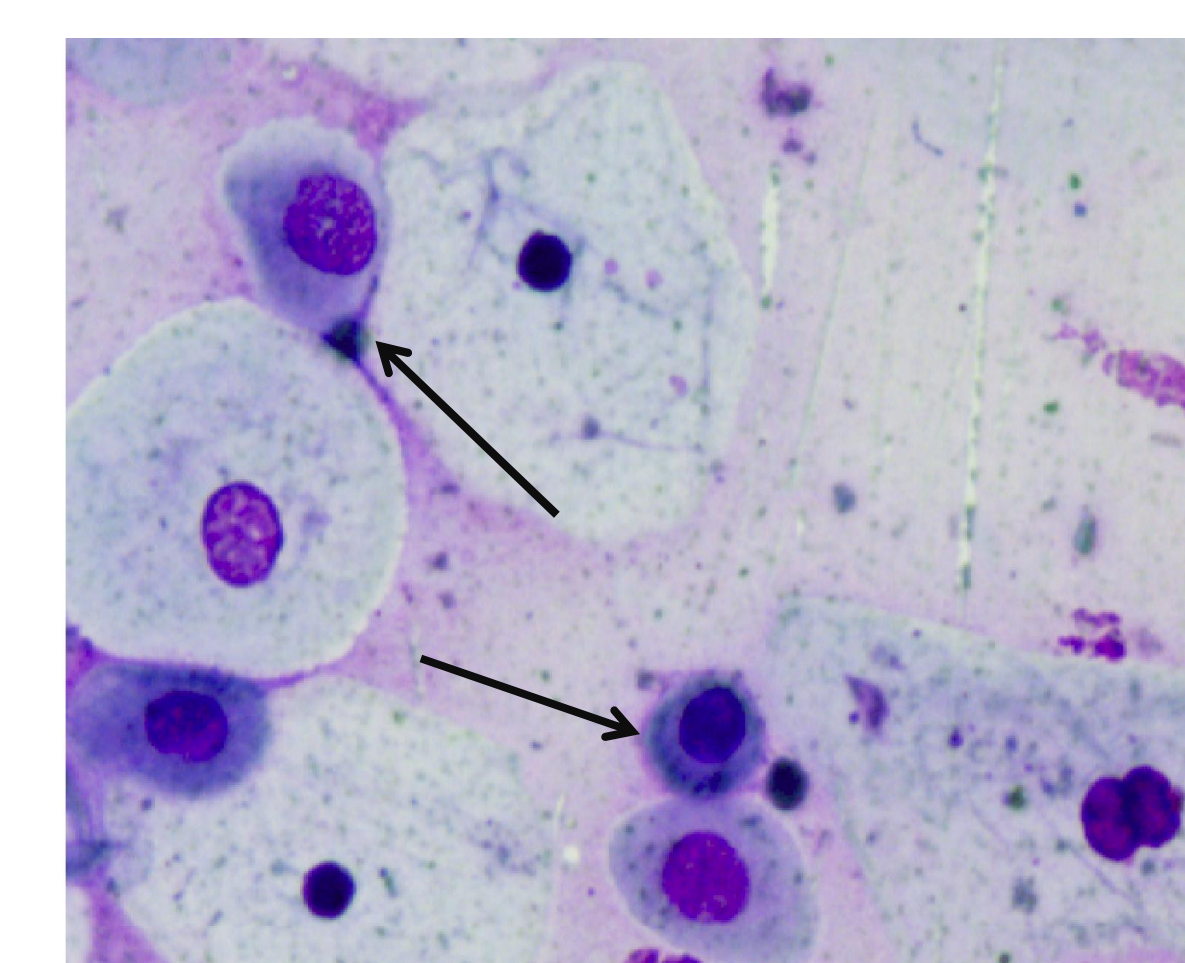
Pic.4. Parabasal (arrows) and intermediate cells in a vaginal smear of adolescent girl with **inadequate compensation (SW)**
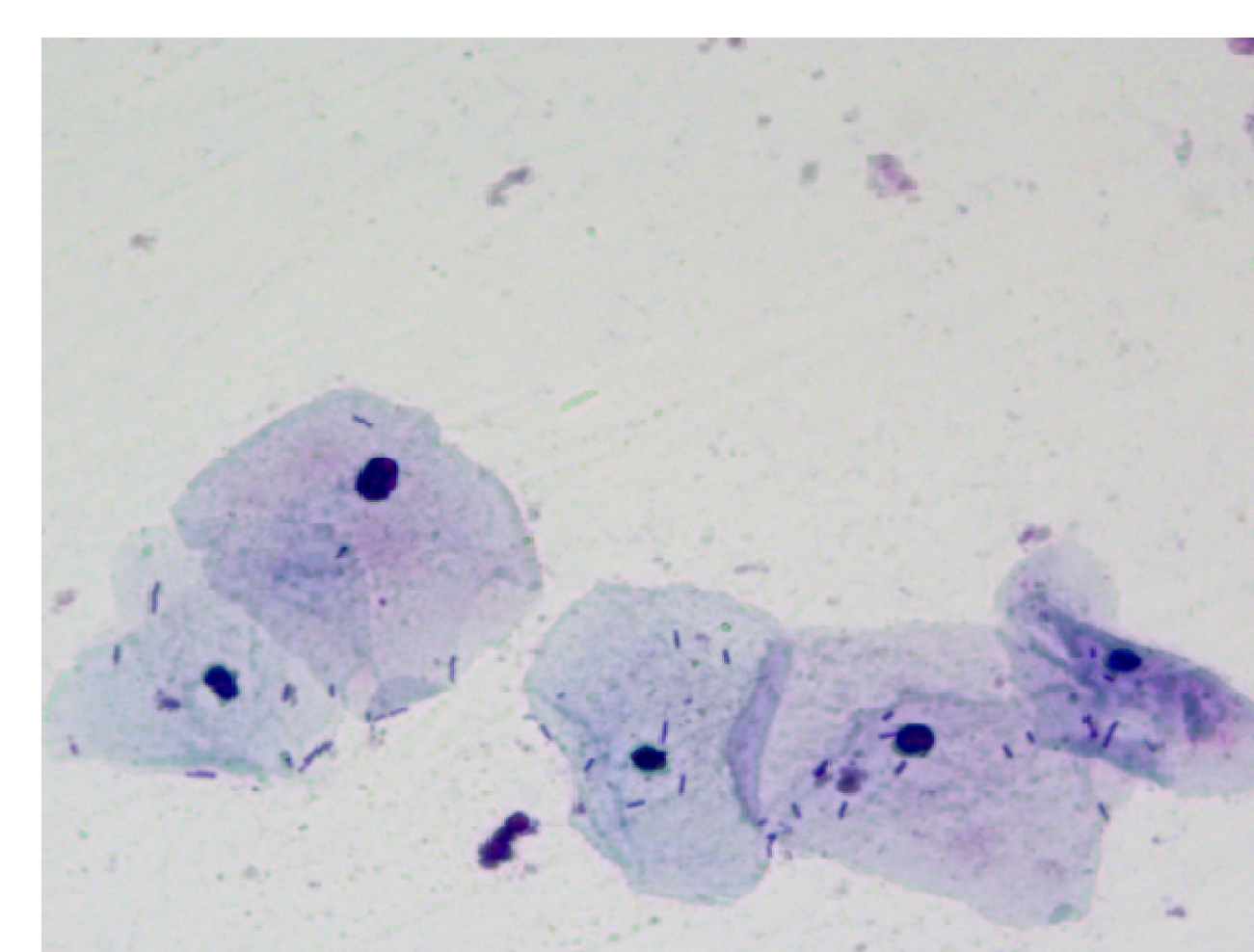
Pic.5. Vaginal smear of **healthy** adolescent girl (superficial cells)

Pic.6. Intermediate cells in a vaginal smear of adolescent girl with **inadequate compensation (SV)**