ASSESSMENT OF MALE INFERTILITY BY TESTICULAR BIOPSY IN SOUTHERN ODISHA

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ABSTRACT

BACKGROUND

Infertility continues to be a significant problem since ages. Studies suggest that the problem affects 8-12% of couples across the globe, and among these affected couples, approximately 50% cases are contributed by the male partner. Semen analysis is the first investigation that indicates towards male factor in infertility. Finding the cause of infertility in cases of severe oligozoospermia and azoospermia by evaluating testicular biopsies has now become essential with the availability of Assisted Reproductive Techniques (ART), which gives information about the level of spermatogenesis. The present study was undertaken to detect the histological findings in cases of male infertility in this geographic region.

MATERIALS AND METHODS

A prospective cross-sectional study was undertaken in which testicular biopsies received from 52 infertile male patients with seminogram impressions of very severe oligozoospermia and azoospermia constituted the study group. Detailed clinical data including the LH. FSH and testosterone hormone levels were recorded. Tissue samples were routinely processed and Haematoxylin and Eosin stained were made. Modified Johnsen scoring was used to categorise each case.

RESULTS

86.5% cases in the study group were found to have azoospermia and rest 13.5% cases had severe oligozoospermia. All the cases were histologically classified into six categories- obstructive pathology 25 of 52 cases (48.1%), pure germ cell aplasia 14 of 52 cases (26.9%), maturation arrest 7 of 52 cases (13.5%), atrophic testis 4 of 52 cases (7.7%), hypospermatogenesis 1 of 52 cases (1.9%) and inconclusive in 1 of 52 cases. Serum FSH and serum LH levels were found significantly raised in cases of pure germ cell aplasia and atrophic testis in contrast cases of obstructive aetiology had normal levels. Modified Johnsen scoring values were 9 in cases with obstructive pathology, 1/2 only in cases of pure germ cell aplasia and atrophic testes and 3 to 6 in cases of maturation arrest.

CONCLUSION

The present study concludes that testicular biopsy is of value in determining the level of spermatogenesis as well as the cause of infertility. The former information will help in deciding the mode of assisted reproductive technology suitable for the individual.

KEYWORDS

Testicular Biopsy, Male Infertility, Johnsen Scoring, Histological Classification, Azoospermia, Oligozoospermia.

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BACKGROUND

WHO and International Committee for Monitoring Assisted Reproductive Technology defines infertility, a disease of the reproductive system as, failure to achieve clinical pregnancy after 12 or more months of regular unprotected sexual intercourse.[1] The global prevalence of this problem is estimated to be 8-12% of couples.[2] In the Indian scenario, a regional variation in the prevalence of the condition in different Indian states had been noticed in various studies, Uttar Pradesh, Himachal Pradesh and Maharashtra have the lowest rate of 3.7%, Andhra Pradesh 5% and highest in Kashmir 15%.[3,4,5] The cause of infertility in a couple was attributed to the male in 20% cases, female 38% cases and both in 27% cases and could not be attributed to either partners in 15% of cases in a metacentric study conducted by WHO.[6] Another Indian study reports nearly 50% of cases are due to anomalies and disorders in the male.[7]

Most aetiological factors of male infertility result in an abnormality in the semen and hence seminogram is widely used as the first choice of investigation in all cases of infertility.[8] Abnormal seminogram parameters below the WHO specified limits in one of the two analyses performed 1 and 4 weeks apart confirms the male infertility.[9,10] Oligozoospermia, asthenozoospermia and teratozoospermia are the commonest abnormalities in a semen analysis of

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which 90% of male infertility is due to oligozoospermia/azoospermia.[11] Besides semen analysis, hormonal assay, antisperm antibody assay, transrectal ultrasonography, vasography and testicular biopsy are the other employed diagnostic modalities. Testicular biopsy has been reported to be very useful in cases of azoospermia and oligozoospermia and normal endocrine function.[12,13]

Aims and Objectives- The present study was undertaken to study the histopathological changes in testicular biopsies in male infertile patients with seminogram showing azoospermia or oligozoospermia in this part of India.

MATERIALS AND METHODS

A prospective study was conducted in the Department of Pathology, MKCG Medical College Hospital, Berhampur, over a period of 2 years in which testicular biopsy received in 10% NBF from 52 cases of infertility with seminogram showing azoospermia or oligozoospermia constituted the study group. A detailed clinical history was obtained from each subject and all relevant other diagnostic findings such as serum FSH, LH and testosterone levels were recorded.

All biopsy samples were routinely processed in an automatic tissue processor and 3 to 5 µ thick sections were obtained using a semiautomatic rotary microtome. Haematoxylin and Eosin staining was performed routinely in all cases.

All slides were independently examined by two pathologists and results were recorded. In case of a discrepancy, both the pathologists sit together to make a consensus result. The evaluations were made in a quantitative manner using the criteria's- (i) General architecture, (ii) Number of seminiferous tubules per LPF, (iii) Size and pattern of the seminiferous tubules, (iv) Thickness of the basement membrane, (v) Germ cell to Sertoli cell ratio, (vi) Leydig cell morphology and number, and (vii) Amount of interstitial tissue. Based on the findings, all cases were grouped into the following 6 groups- (a) Obstructive pathology, (b) Pure germ cell aplasia, (c) Maturation arrest, (d) Atrophic testis, (e) Hypospermatogenesis, and (f) Inconclusive.

Modified Johnsen scoring criteria was used to assess the spermatogenesis, which was given in Table 1.

Score	Description
Score - 10	Full spermatogenesis
Score - 9	Disorganised epithelium, slightly impaired spermatogenesis, many late spermatids
Score - 8	Less than five spermatozoa per tubule, few late spermatids
Score - 7	No spermatozoa, no late spermatids, many early spermatids
Score - 6	No spermatozoa, no late spermatids, few early spermatids
Score - 5	No spermatozoa or spermatids, many spermatocytes
Score - 4	No spermatozoa or spermatids, few spermatocytes
Score - 3	Spermatogonia only
Score - 2	No germinal cells, Sertoli cells only
Score - 1	No seminiferous epithelium

Table 1. Modified Johnsen Scoring Criteria

RESULTS

The age range of the 52 cases ranged from 26 to 45 years with a mean age of 32.7 ± 6.3 years. 26-30 years age group accounting for 42.3% cases followed by 31-35 years age group, 26.9% cases. Primary infertility cases were comparatively more accounting for 42 cases (80.8%) and the remaining 10 cases (19.2%) were secondary infertility. 86.5% of the study group had azoospermia in semen analysis and 13.5% cases had oligozoospermia.

The case distribution as per the histopathological category was given in Table 2. Approximately, half of the cases 25 of 52 cases were into the obstructive category making it the most common category followed by pure germ cell aplasia, 14 of the 52 cases (26.9%). One case was reported as inconclusive as the tissue sections contained only capsular fibrocollagenous tissue only.

Category	No. of Cases	Percentage
Obstructive pathology	25	48.07%
Pure germ cell aplasia	14	26.92%
Maturation arrest	7	13.46%
Atrophic testis	4	7.69%
Hypospermatogenesis	1	1.92%
Inconclusive	1	1.92%

Table 2. Case Distribution Based on Histology

The Johnsen scoring in all the cases has been documented in Table 3. All 18 cases of pure germ cell aplasia and testicular atrophy scored 1 or 2. spermatogenesis was good with a score of 9 in 23 cases of obstruction.

Score	No. of Cases	Percentage
Score 10	2	3.92%
Score 9	23	45.09%
Score 8	1	1.96%
Score 7	0	0%
Score 6	1	1.96%
Score 5	3	5.88%

Score 4	1	1.96%
Score 3	2	3.92%
Score 2	14	27.45%
Score 1	4	7.84%
Total	**51**	**100%**

Table 3. Johnsen Score

The Johnsen's score in different histopathological categories is depicted in Table 4.

Histopathological Categories	Johnsen's score									
	10	9	8	7	6	5	4	3	2	1
Obstructive pattern	√	√								
Pure germ cell aplasia									√	
Atrophic testis										√
Hypospermatogenesis			√							
Maturation arrest				√	√	√	√	√		

Table 4. Johnsen Scoring Pattern in Various Histopathological Categories

Correlating the hormonal status with the histopathological categories, it was clearly observed that all cases with pure germ cell aplasia and atrophic testes had low testosterone and high FSH and LH levels. No significant relation was found in other categories.

DISCUSSION

Worldwide though male factor contributes to more than half of all cases of infertility, yet it is a reproductive health problem that is poorly studied and understood. Pattern of male infertility vary greatly among regions and even within regions. A combination of social habits, genetic causes and environmental conditions such as underlying infections, chemicals, radiation and exposure to heat is suspected to contribute to this variation.[14,15]

Male infertility had been categorised to pre-testicular, testicular and post-testicular causes.[16] Identification of the post-testicular causes, i.e. obstructive causes can be managed by cost-effective treatment options.[17] Testicular biopsy remains as the corner stone of male infertility investigation.[18] In addition to providing definitive information about the cause of male infertility, it provides some other very useful informations like availableness of spermatozoa for ART and diagnosis of neoplasia.[19]

The present study noted a mean age of 32.7 years in the infertile males and in them primary infertility was more in incidence. This observation was in concordant with the observations of KH Tan et al.[20] Seminogram revealed azoospermia in 86.5% cases and oligozoospermia in 13.5% cases in the study. Studies by many authors were limited to cases of azoospermia only.[17,20]

Obstruction was the commonest histopathological type encountered in this study accounting for 48% cases, and in all these cases, the spermatogenesis was normal having a modified Johnsen score of 9 and 10. Many authors had similar observations. The obstructive cause accounting for 31-38%.[17,21,22] Pure germ cell aplasia accounted for 26.9% cases with a modified Johnsen score of 2. This observation was similar to the observation of 23.5% by Al-Rayess et al.[22] However, Rashed M et al had a higher incidence in his study accounting for 34% cases.[17] Several authors had a very low incidence rate of pure germ cell aplasia of 8%, 9% and 12.5%.[16,21,23] Maturation arrest prevalence in the present study was 13.5%, which was similar to the observations of Brannen and Roth et al (1979) 12.55%, Al-Rayess et al (2000) 11%,[21,22] Thomas Jo et al (1990) 5% and Hadded et al (2004) reported a very low prevalence of maturation arrest 5% and 1.7% only.[23,24] The observation of hypospermatogenesis prevalence in this study was only 1.92% and all cases had a modified Johnsen score of 8. This was discordant to the observation of most of the other authors like Haddad et al (2004) 55.8%, Meinhard et al (1973) 46%, Thomas Jo et al (1990) 19%, Wong et al (1973) 23% and Brannen and Roth et al (1979) 27%.[16,21,23,24,25] Testicular atrophy with modified Johnsen score of 1 was found to have a prevalence in the present study was 7.9%. Rashed M et al (2008), Meinhard et al (1973) and Al-Rayess et al (2000) had similar findings.[17,22,25]

CONCLUSION

Male infertility is almost equal contributor to total cases of infertility. Testicular biopsy gives valuable information regarding the spermatogenesis of the individual and helps immensely in deciding the further course of management such as microsurgical reconstruction in cases of obstructive aetiology and sperm harvesting for ART in cases of azoospermia.

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